Fig.1

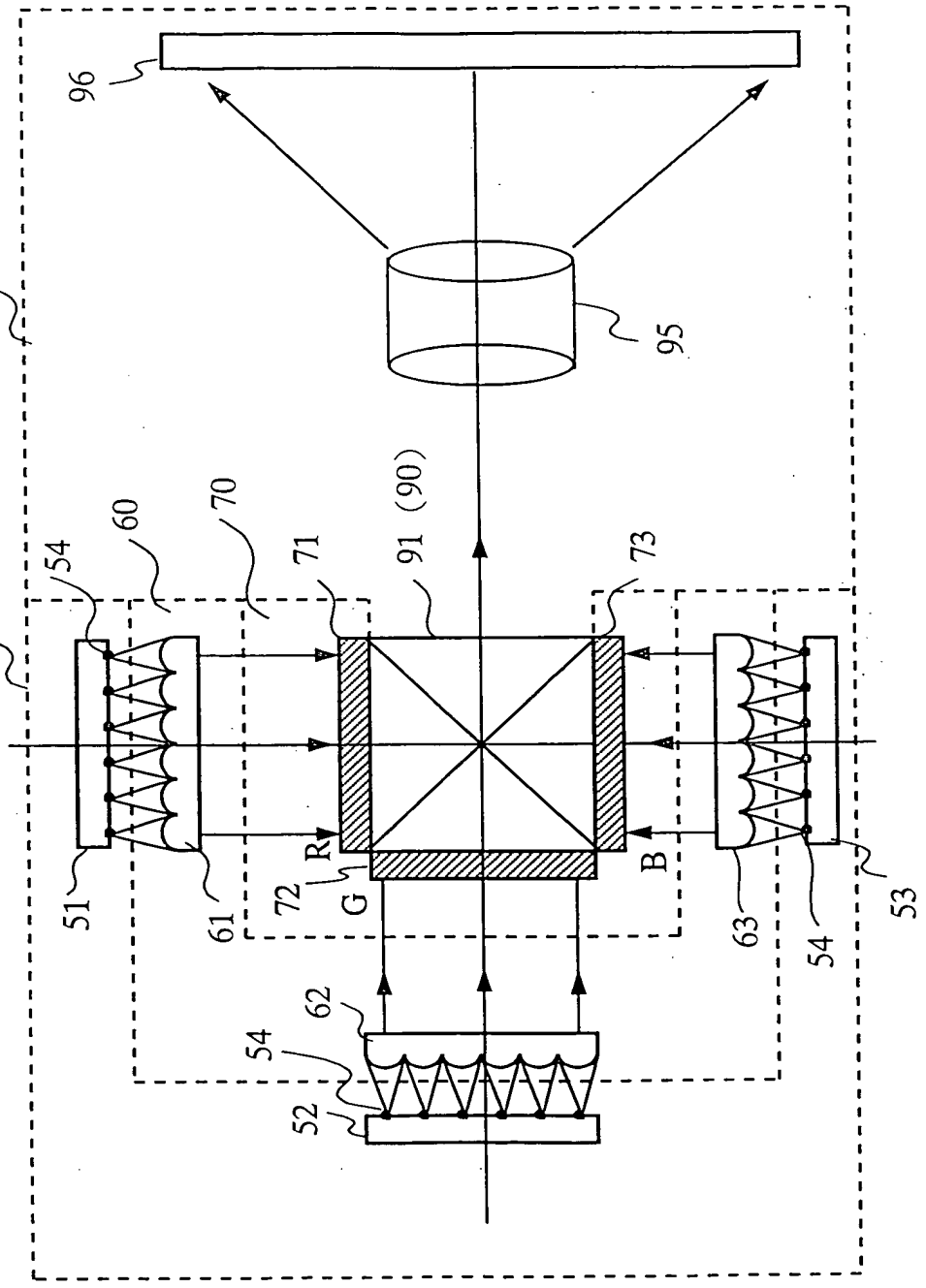


Fig.2

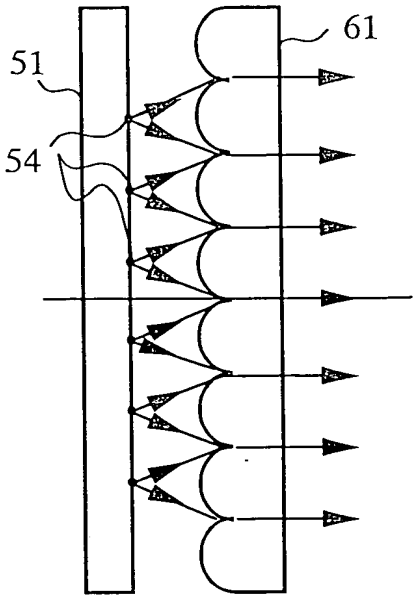


Fig.3

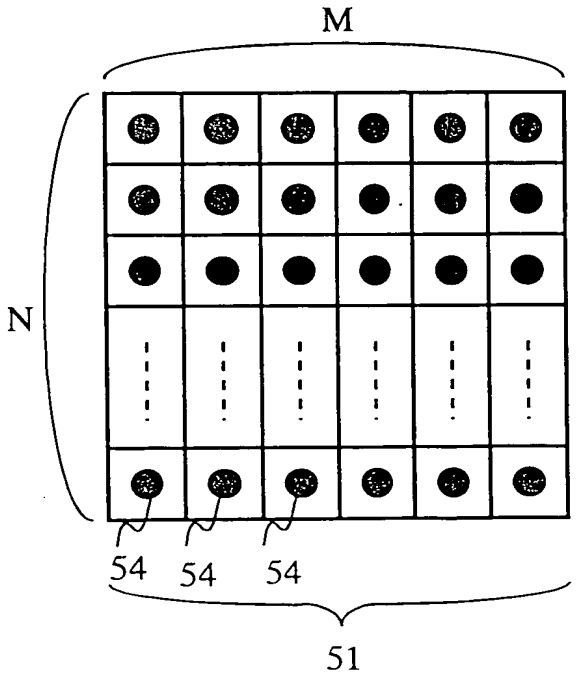


Fig.4

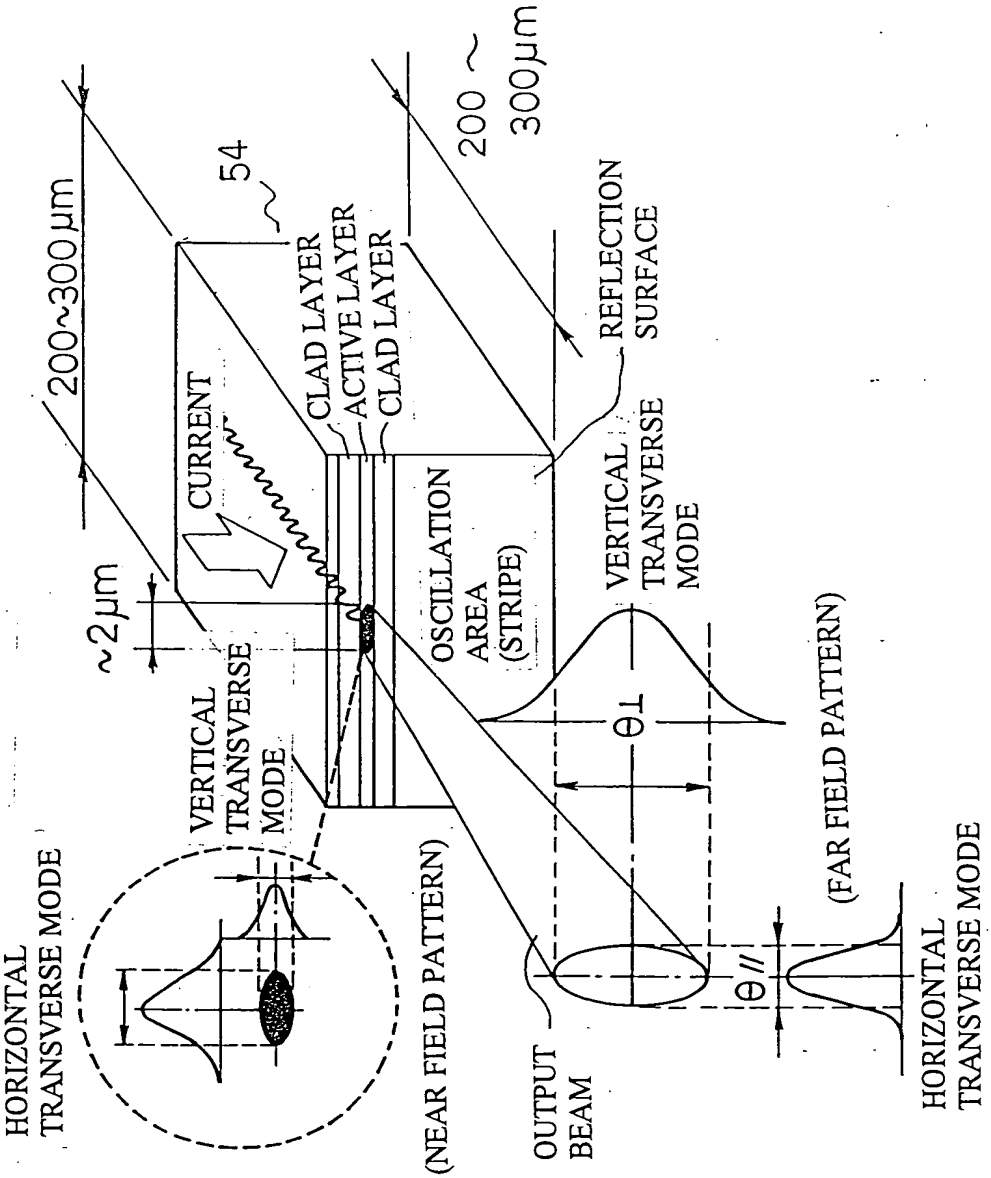

200~300μm
54
200 ~ 300μm
CURRENT
CLAD LAYER
ACTIVE LAYER
CLAD LAYER
REFLECTION SURFACE
~2μm
VERTICAL TRANSVERSE MODE
OSCILLATION AREA (STRIPE)
VERTICAL TRANSVERSE MODE
θ⊥
HORIZONTAL TRANSVERSE MODE
(NEAR FIELD PATTERN)
OUTPUT BEAM
θ//
(FAR FIELD PATTERN)
HORIZONTAL TRANSVERSE MODE

Fig.5

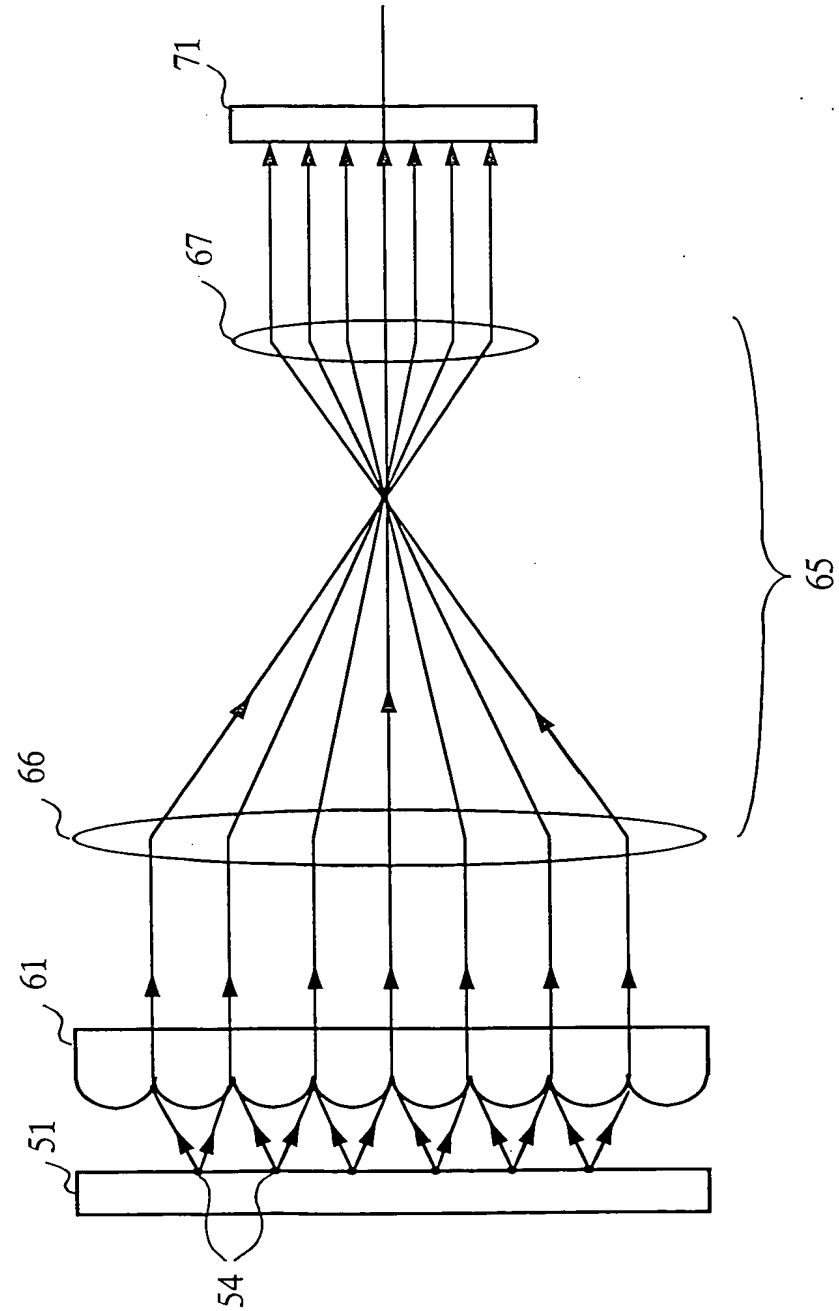


Fig.6

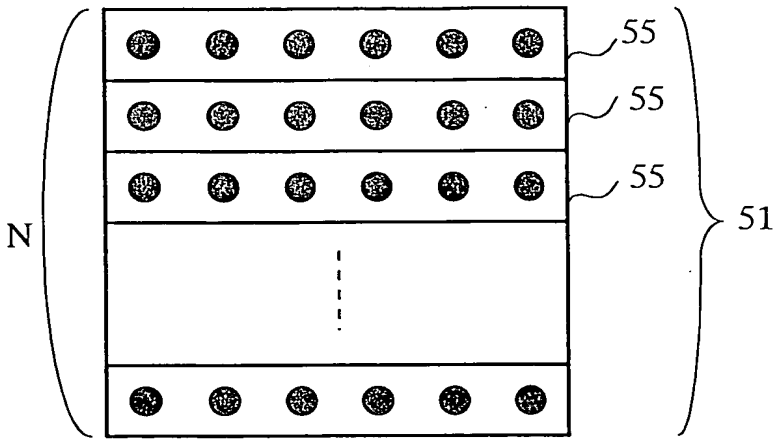


Fig.7

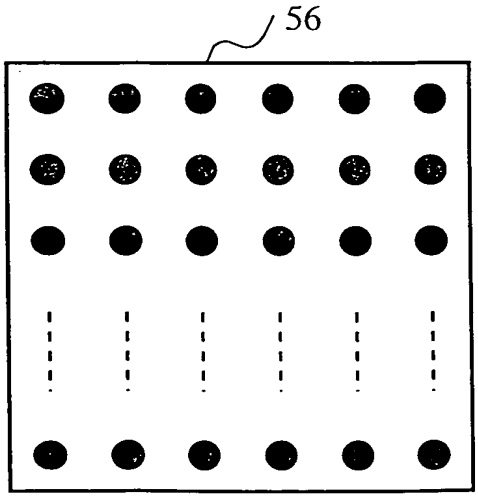


Fig.8

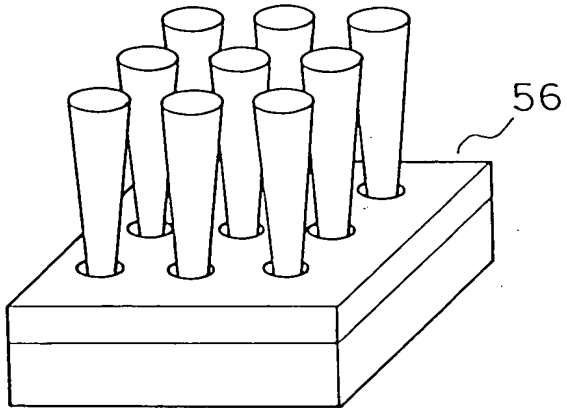


Fig.9

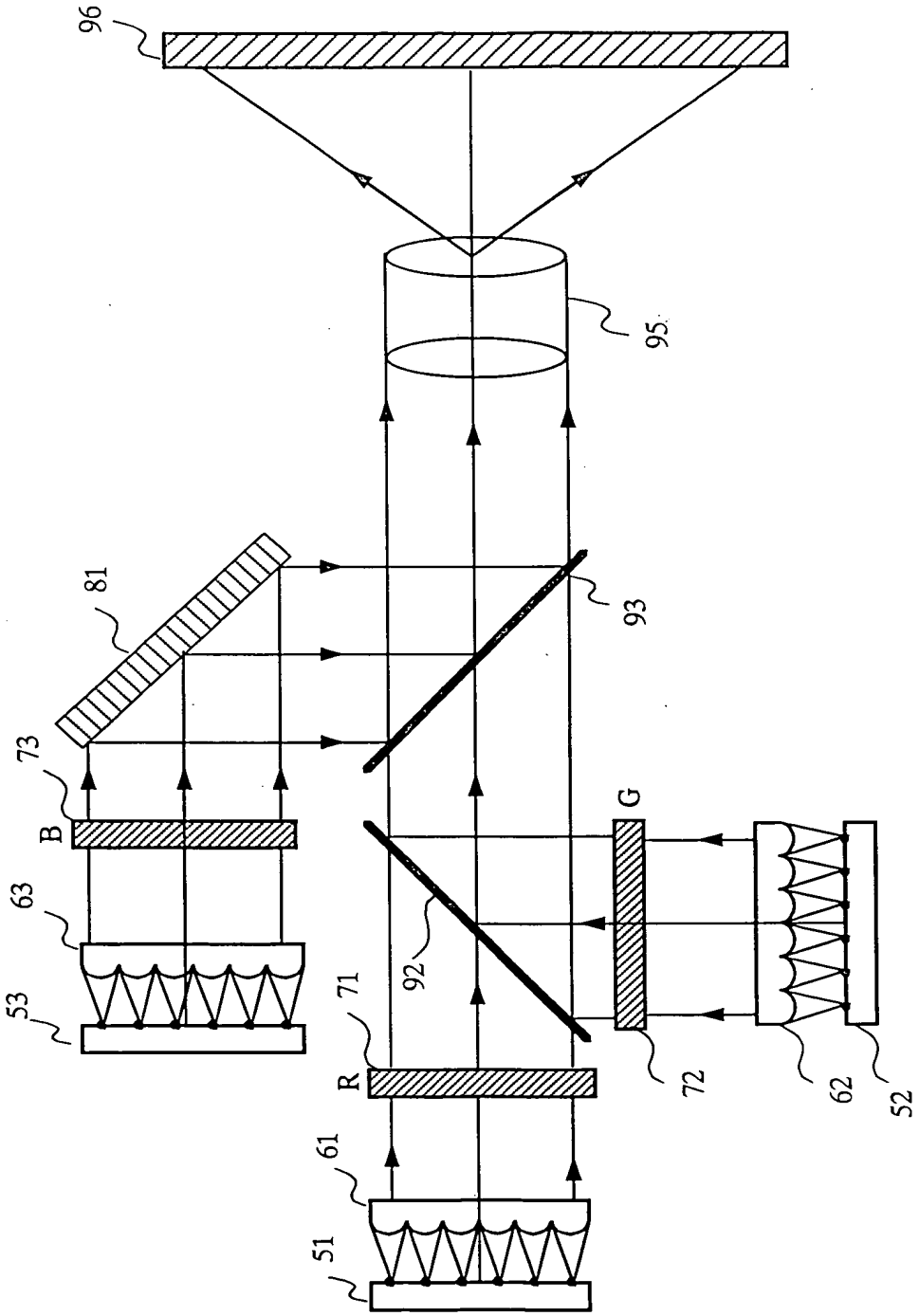


Fig.10

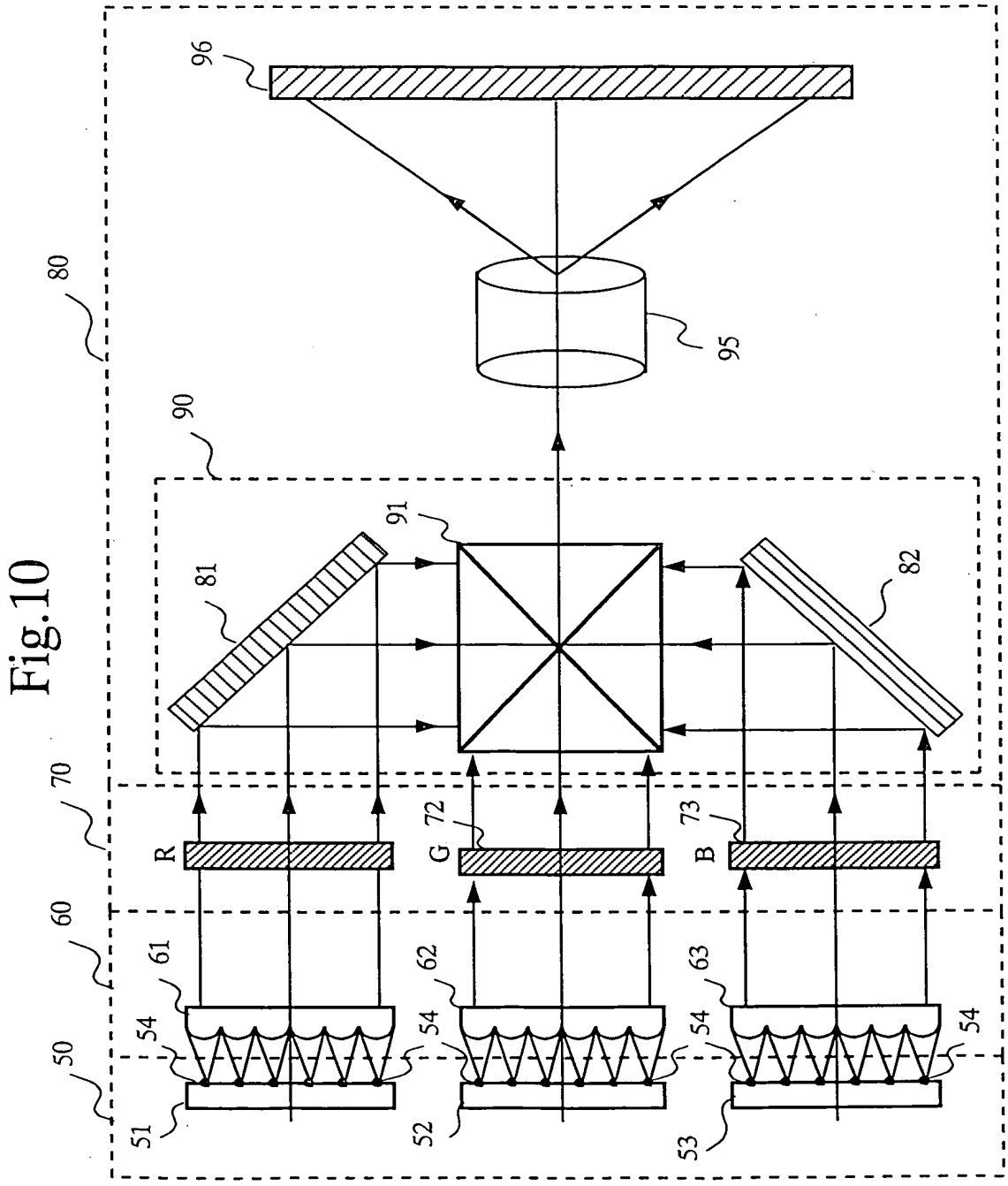


Fig.11

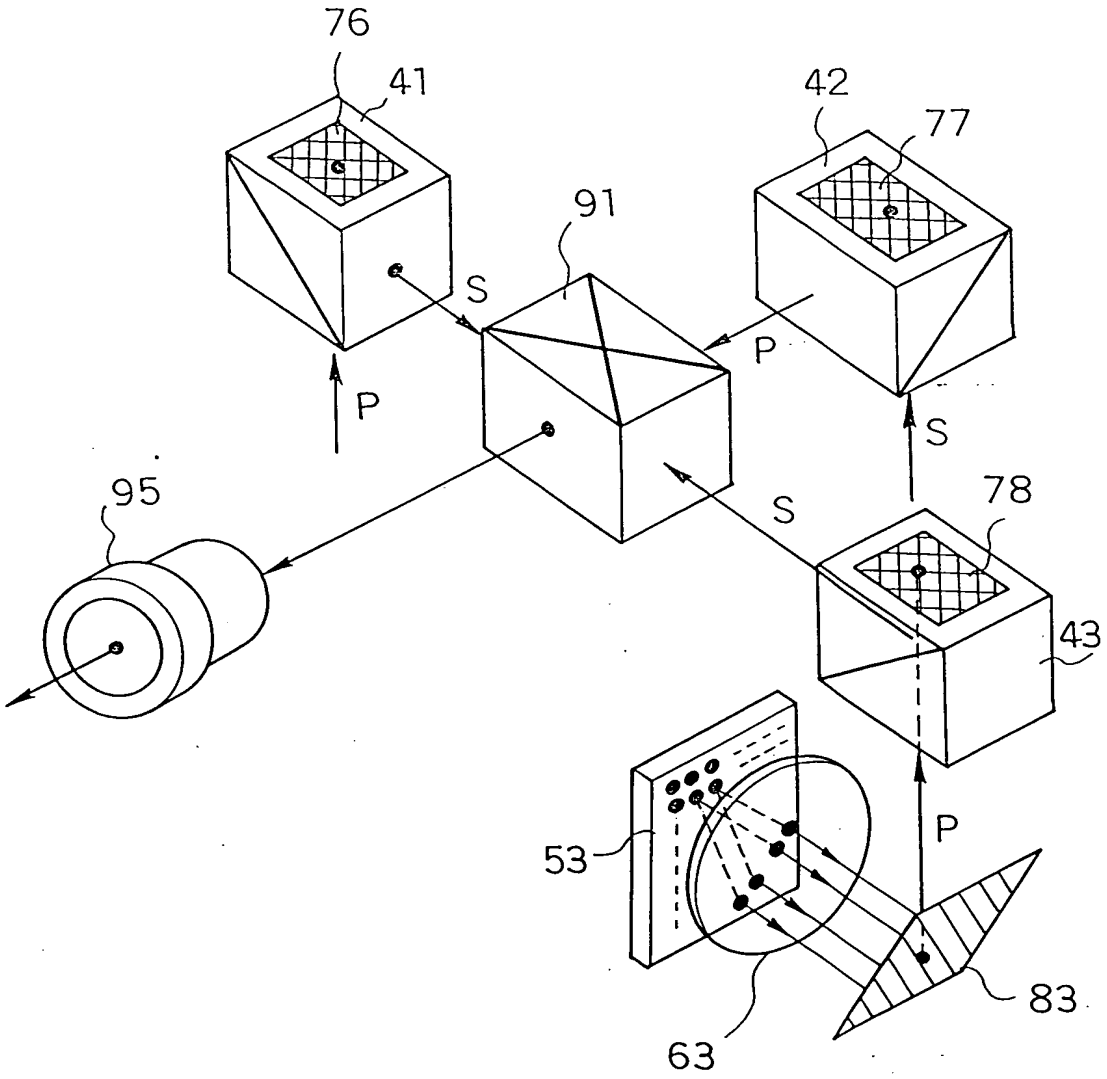


Fig.12

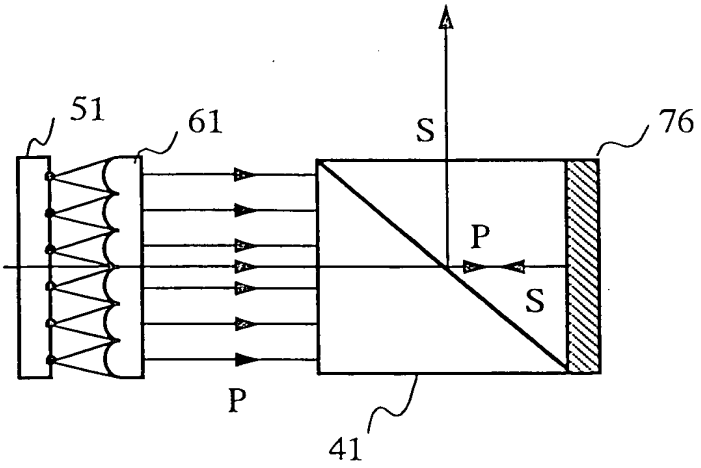


Fig.13

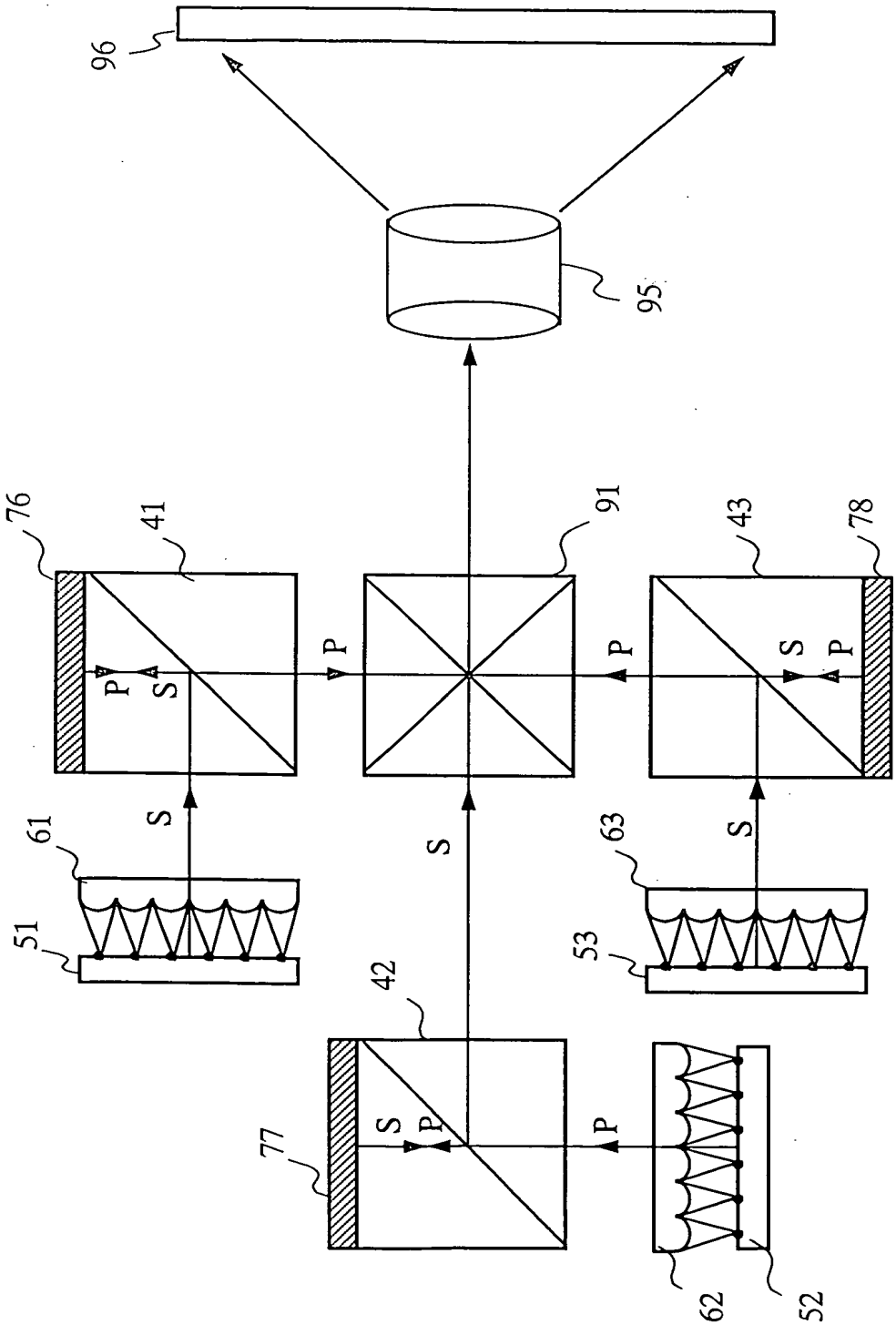


Fig.14

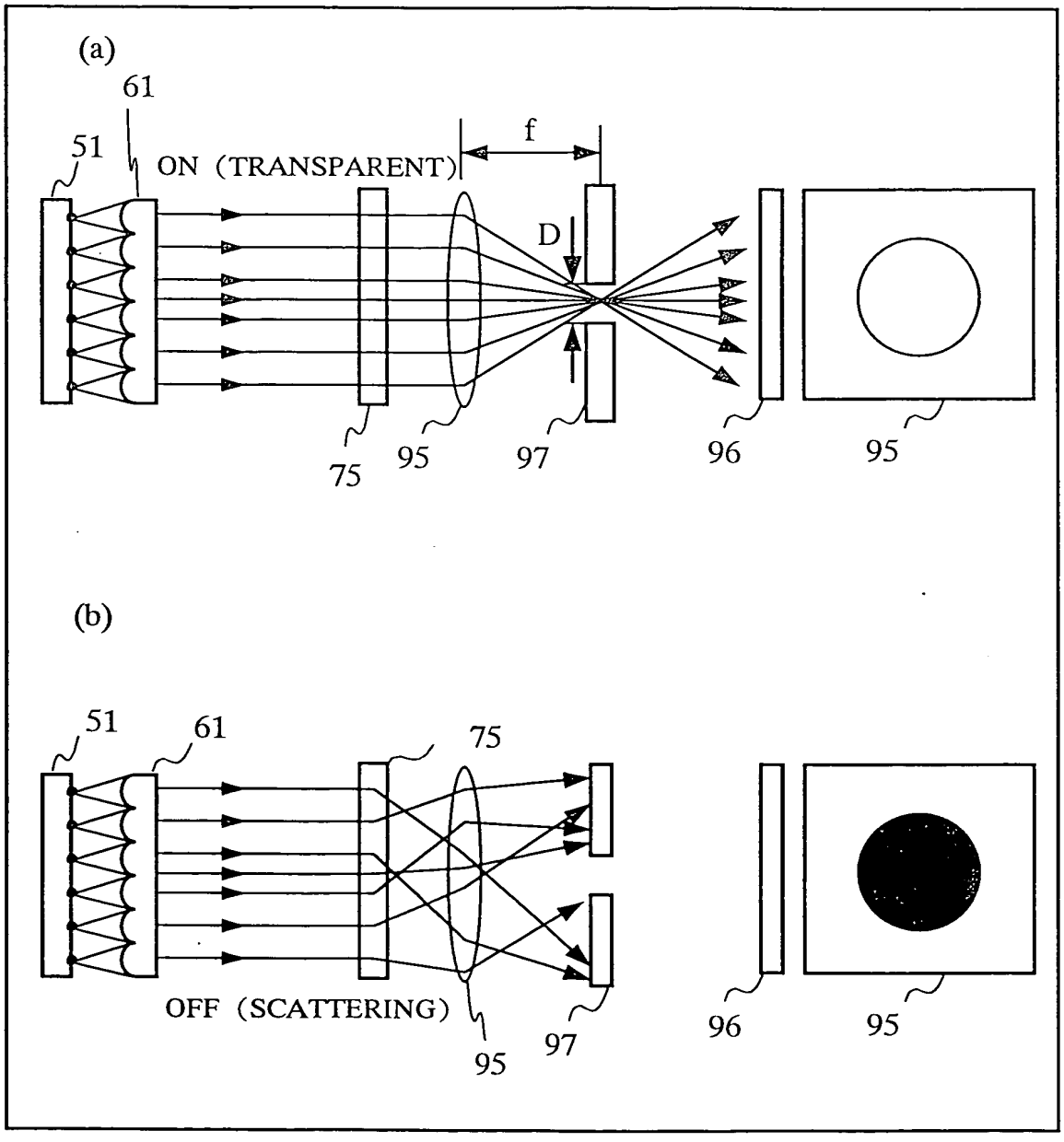

(a)
61
51
ON (TRANSPARENT)
f
D
75
95
97
96
95
(b)
51
61
75
OFF (SCATTERING)
95
97
96
95

Fig.15

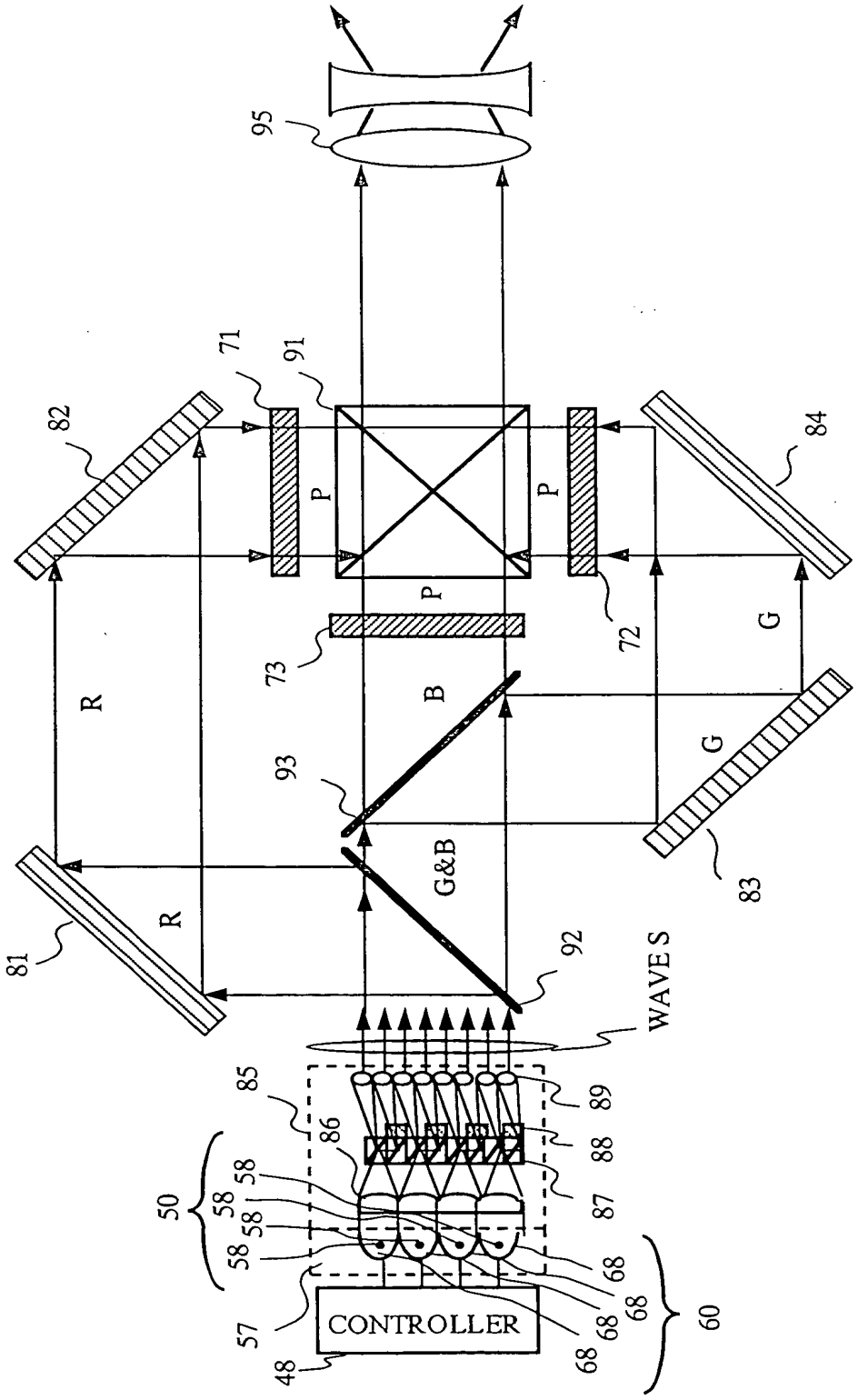

95
71
91
82
84
P
P
P
72
73
G
B
R
93
G
G&B
R
81
83
92
WAVES
85
89
86
88
58
58
58
58
87
50
68
68
68
68
68
57
CONTROLLER
48
60

Fig.16

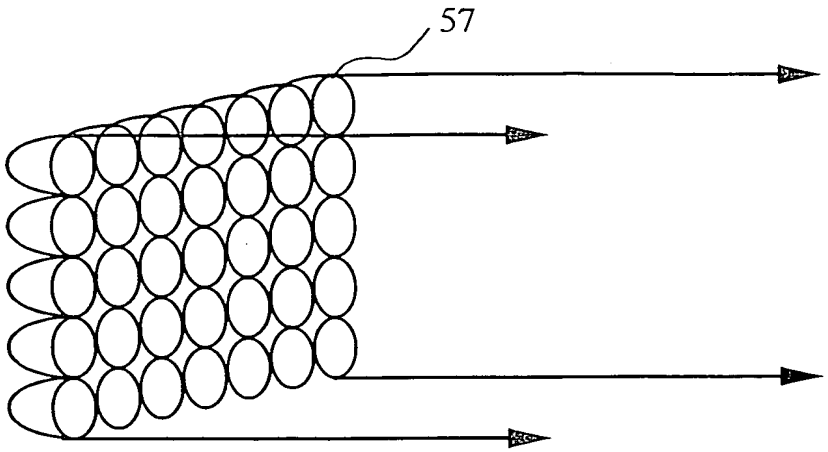


Fig.17

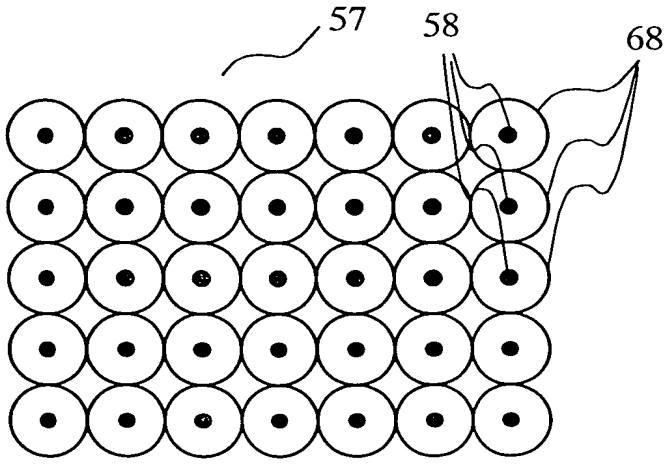


Fig.18

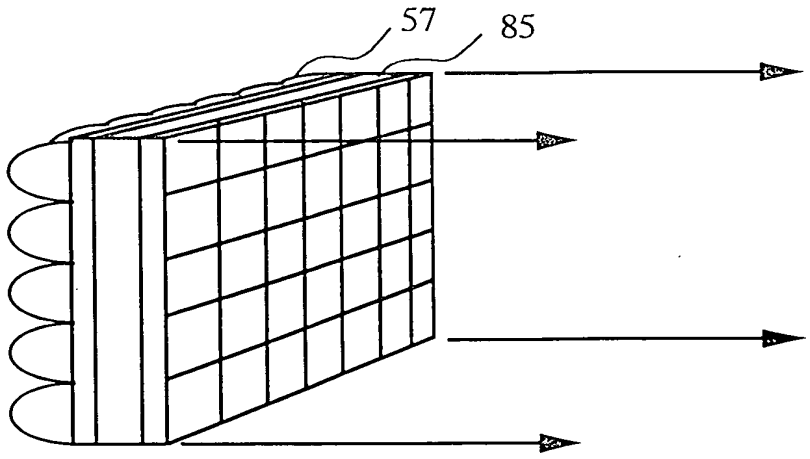


Fig.19

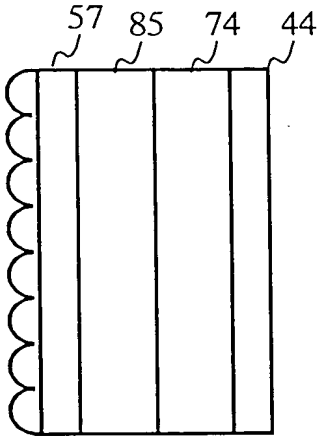


Fig.20

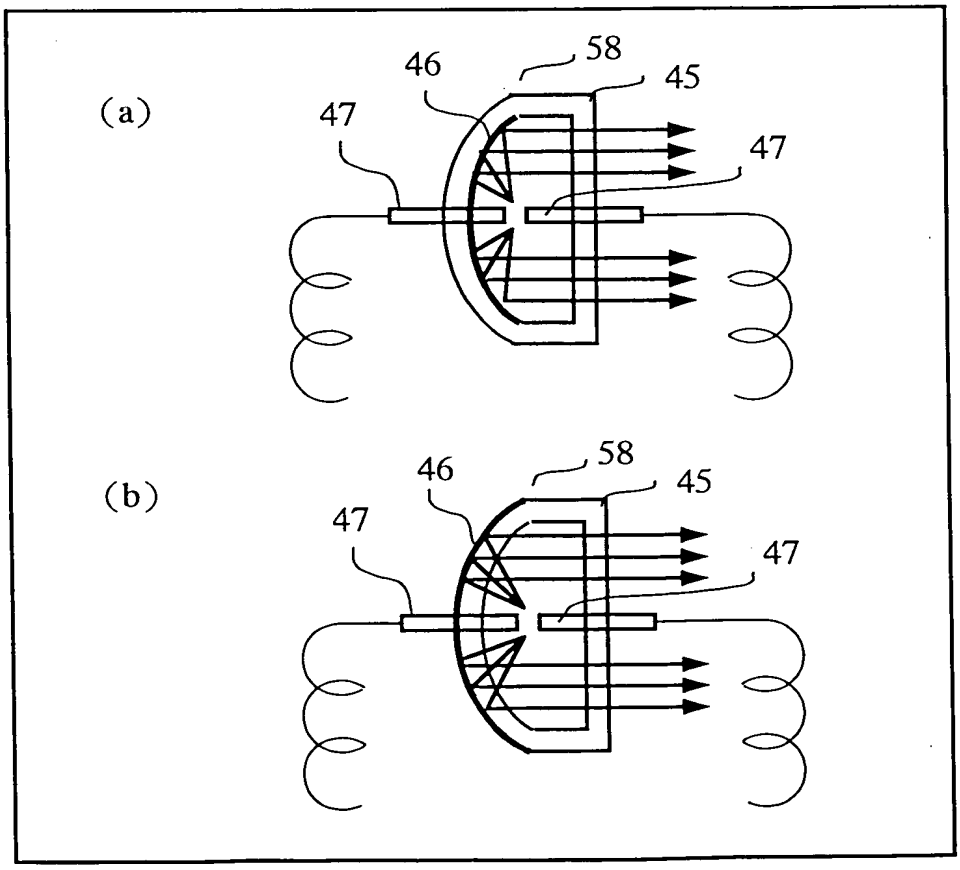


Fig.21

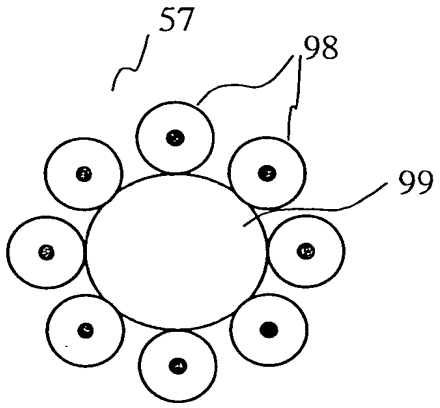


Fig.22

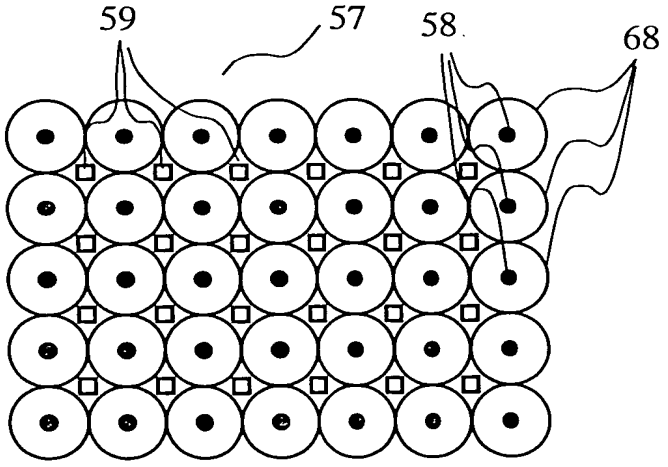


Fig.23

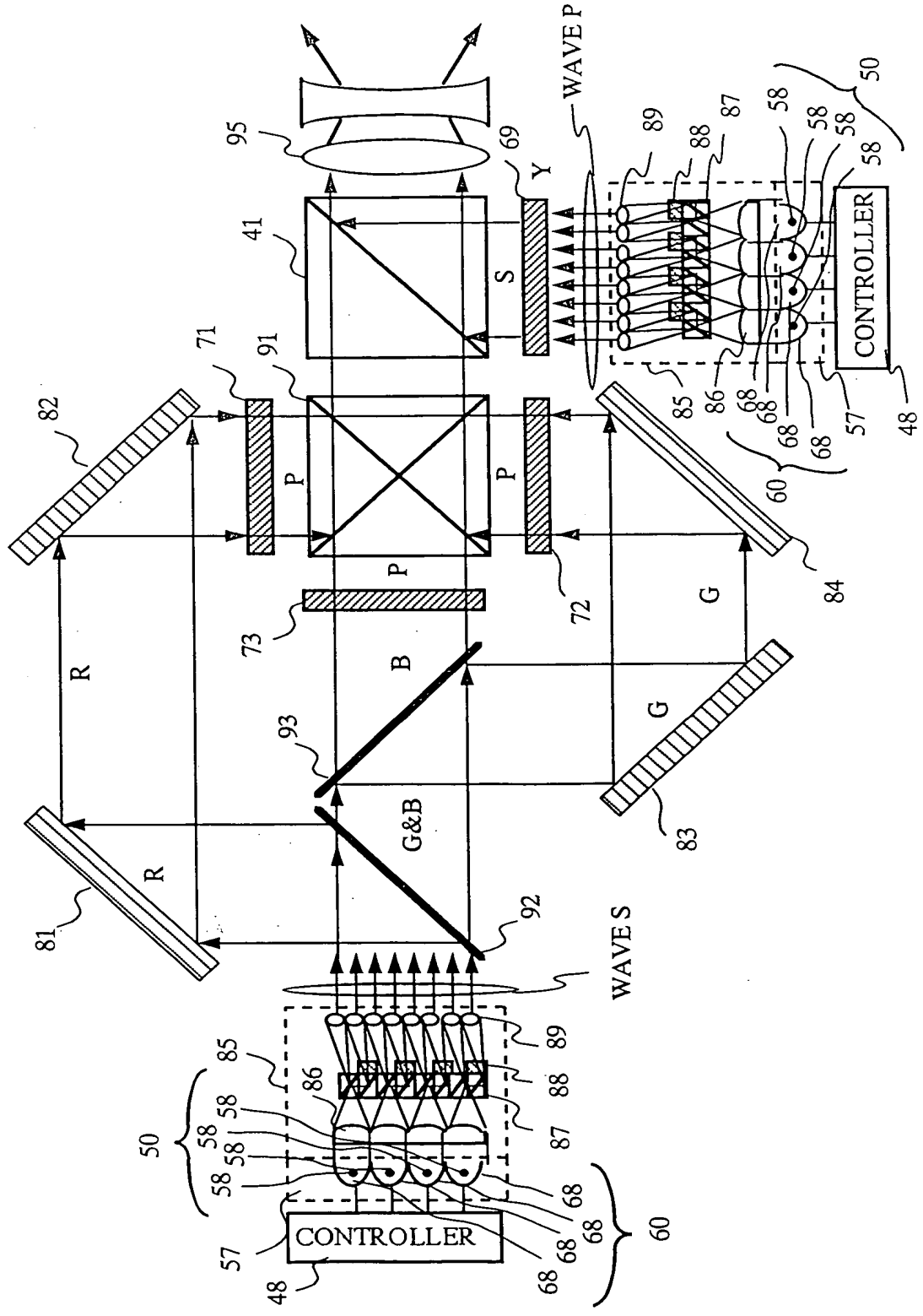


Fig.24

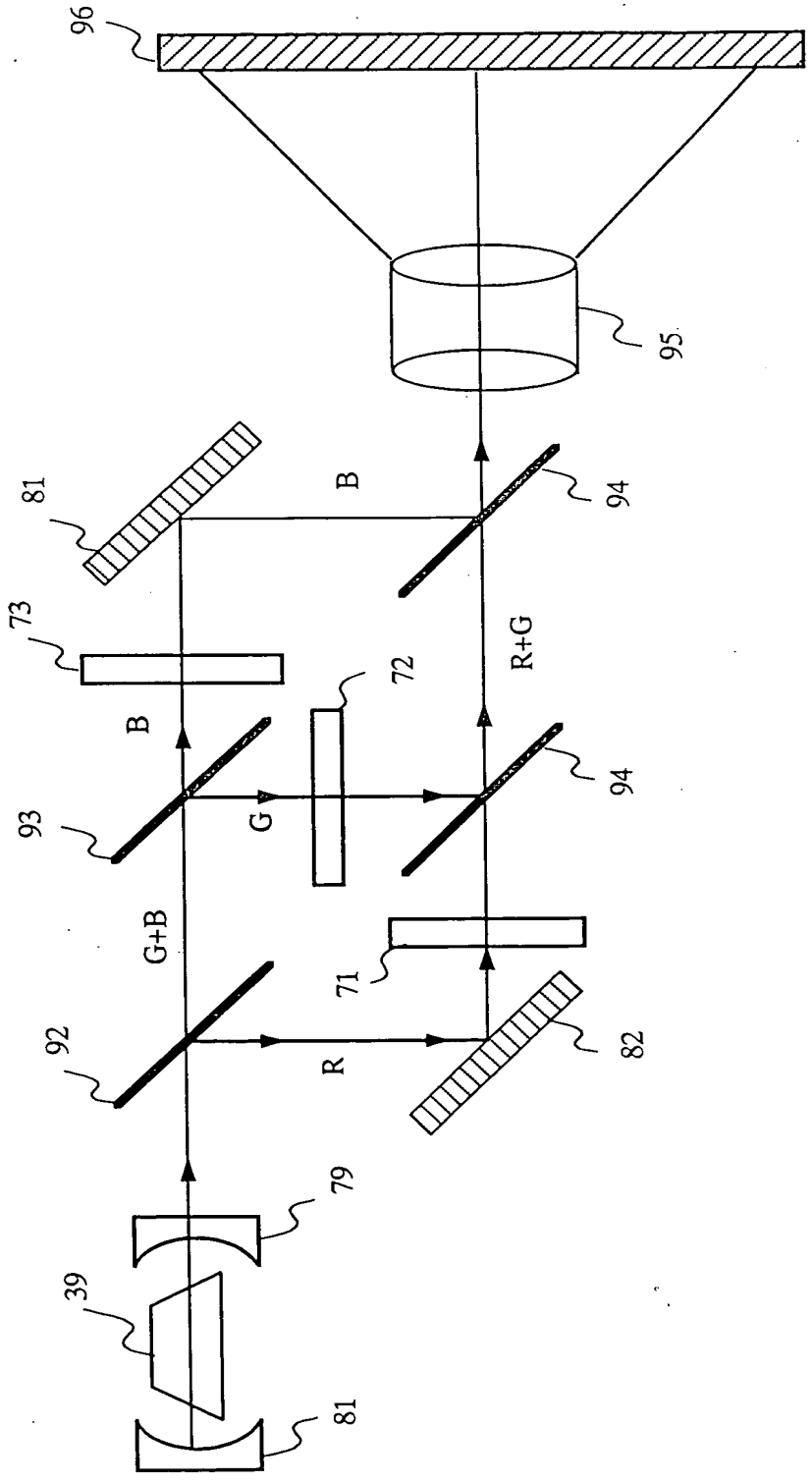


Fig.25

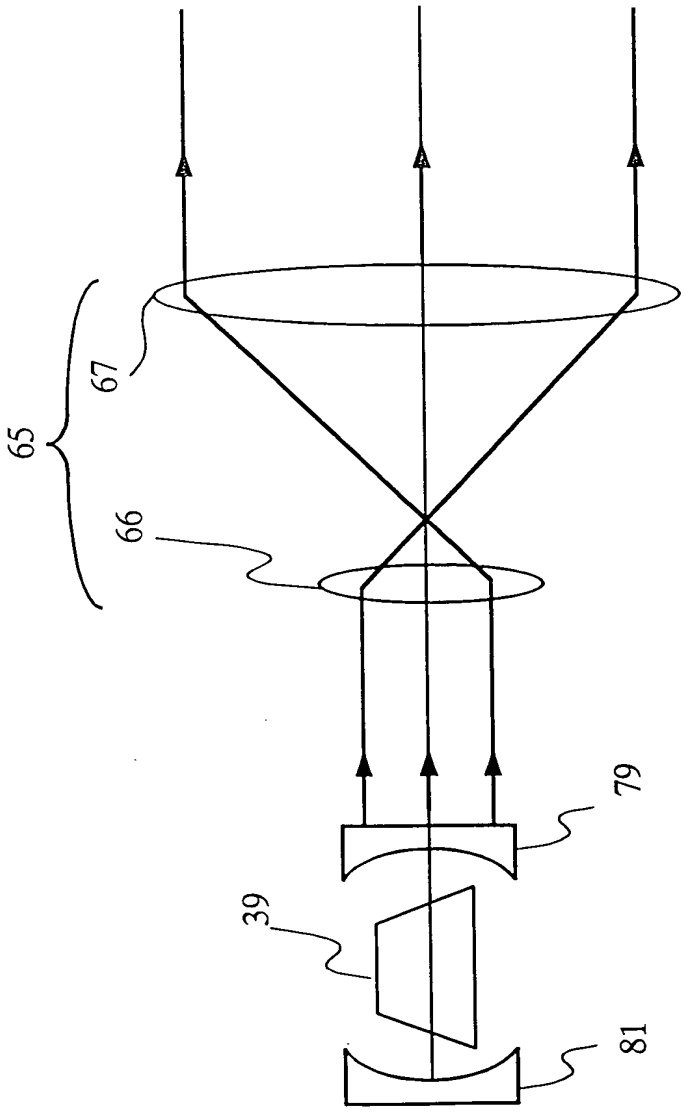


Fig.26

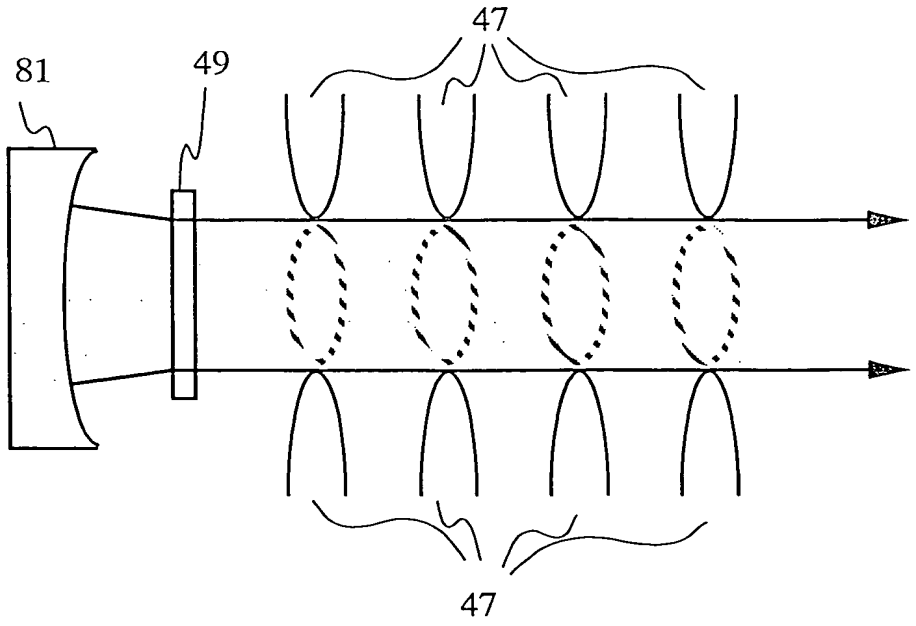


Fig.27

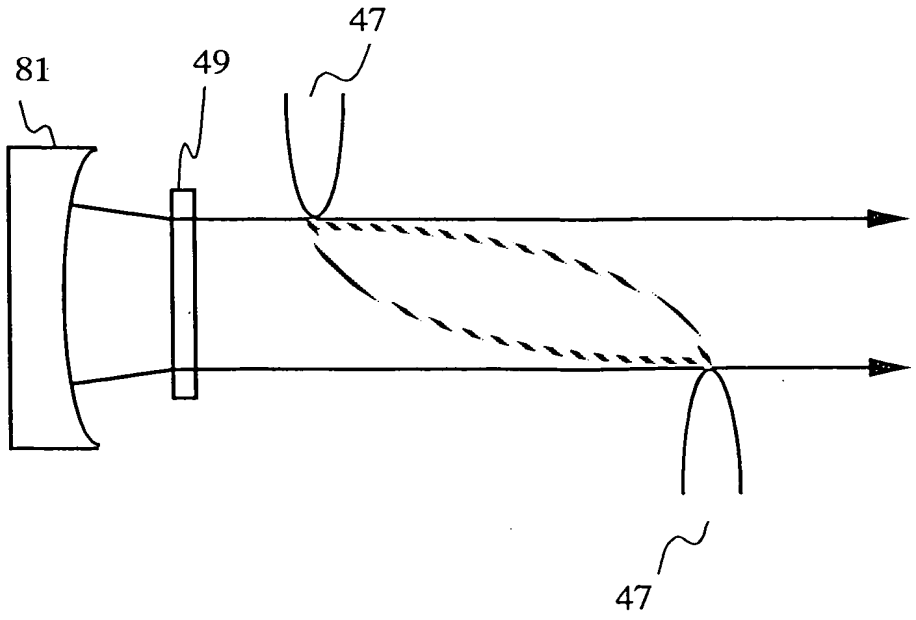


Fig.28

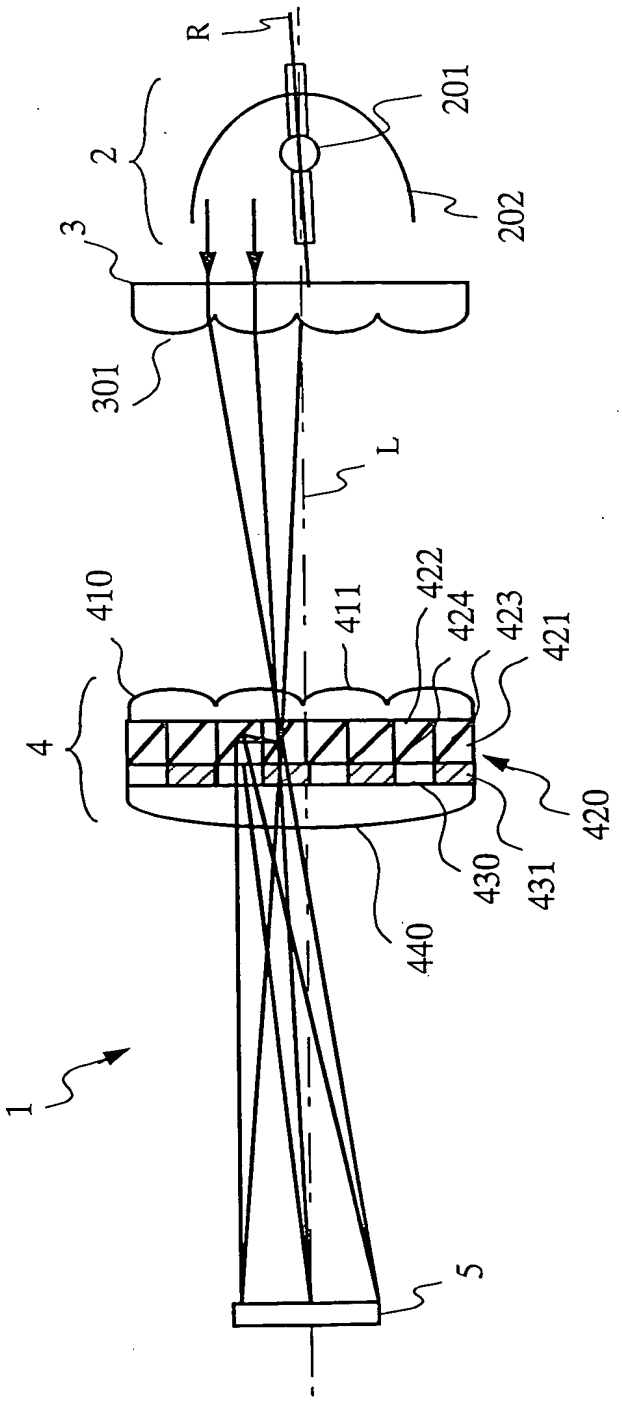


Fig.29

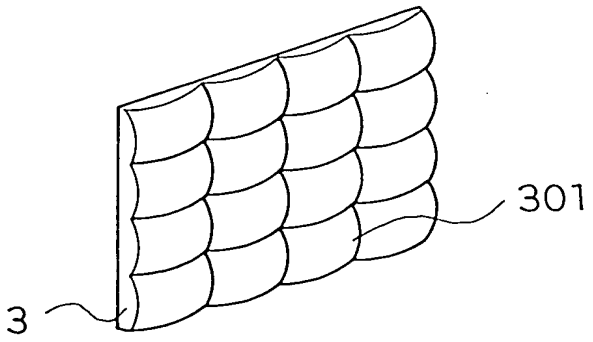


Fig.30

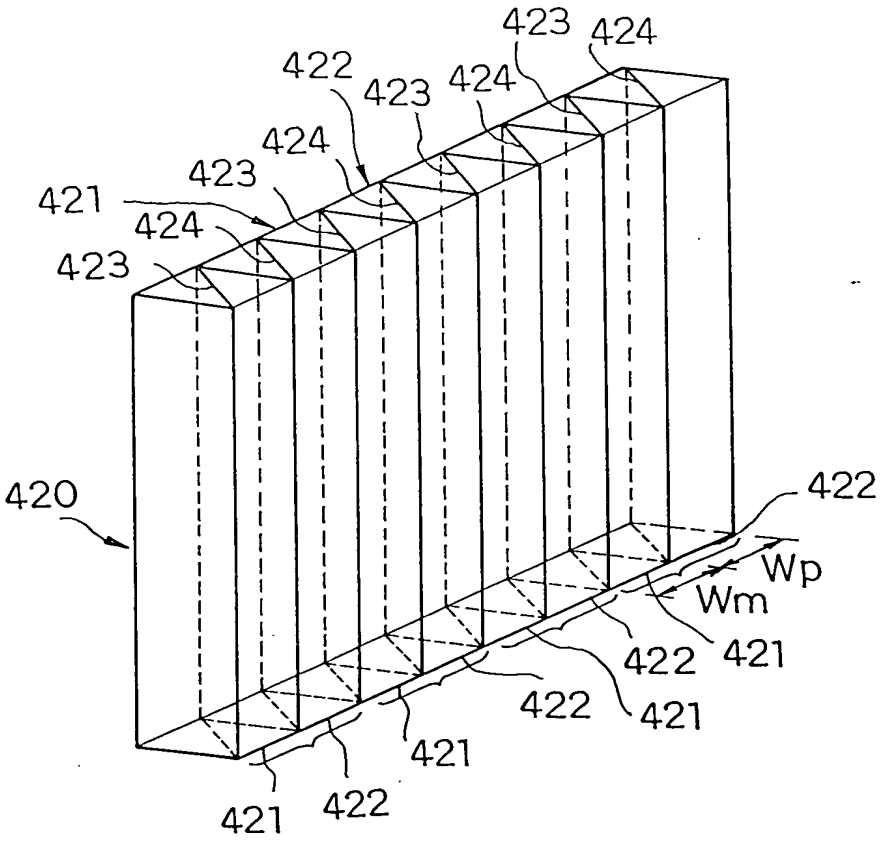

423
424
422
423
424
424
423
421
424
423
420
422
Wp
Wm
421
422
421
422
421
421
422

Fig.31

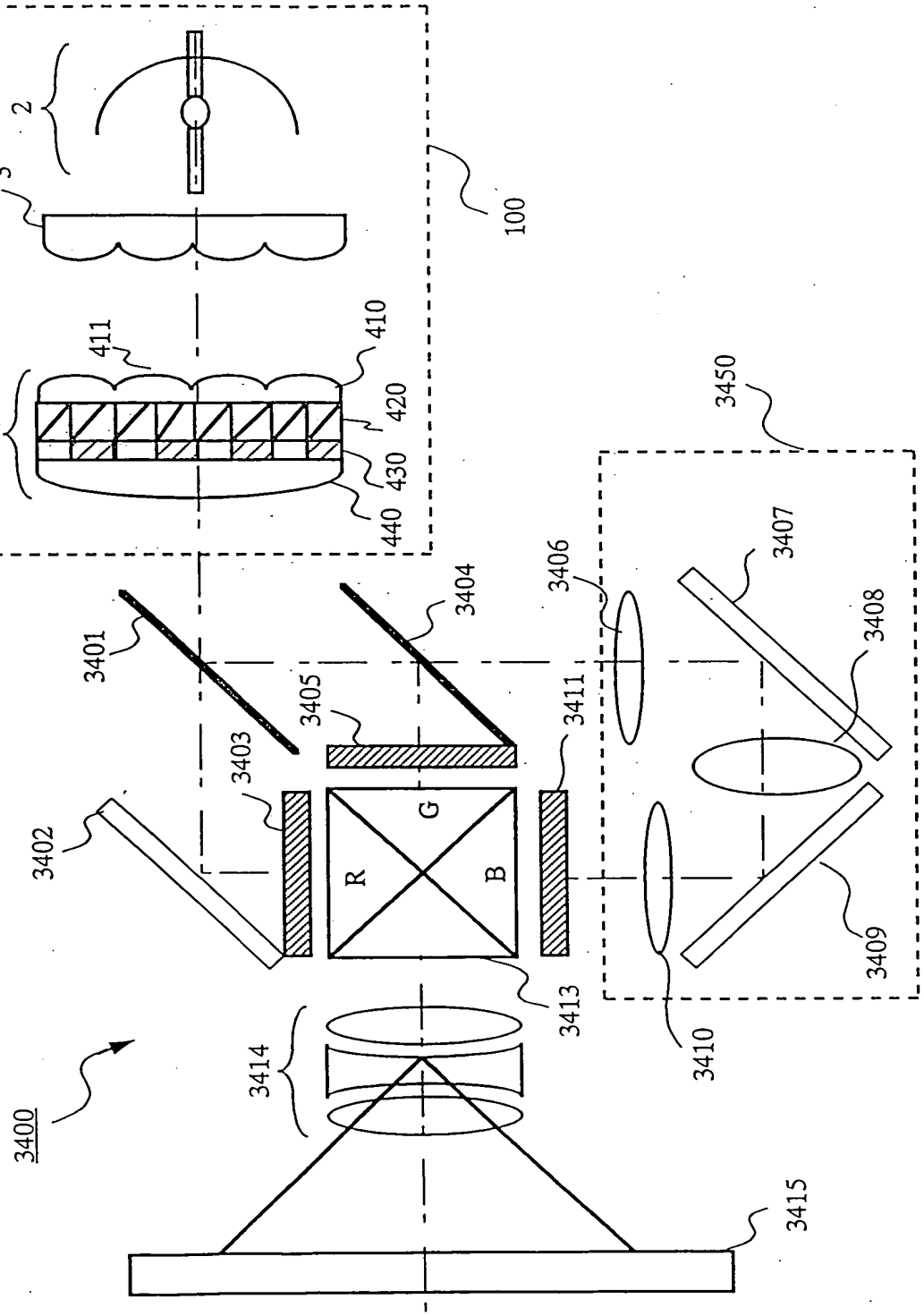

100
2
3
4
410
411
420
430
440
3400
3401
3402
3403
3404
3405
3406
3407
3408
3409
3410
3411
3413
3414
3415
3450
R
G
B

Fig.32

LAMP	METAL HALIDE	XENON	HALOGEN
LUMINOUS EFFICIENCY	80 lm/W	30 lm/W	30 lm/W
COLOR TEMPERATURE	9000 K	6500 K	3000 K
LIFE TIME	2000 H	500 H	100 H

Fig.33

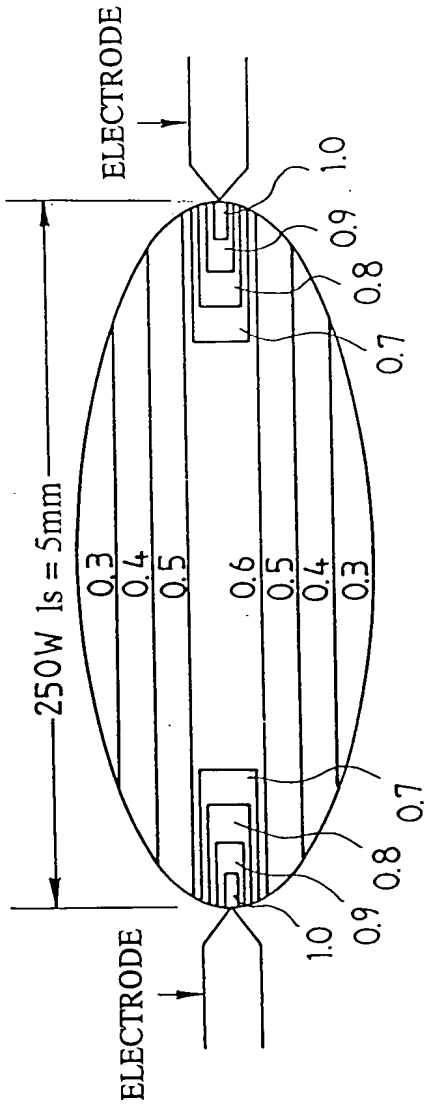

ELECTRODE
1.0
0.9
0.8
0.7
250W ls = 5mm
0.3
0.4
0.5
0.6
0.5
0.4
0.3
0.7
0.8
0.9
1.0
ELECTRODE

Fig.34

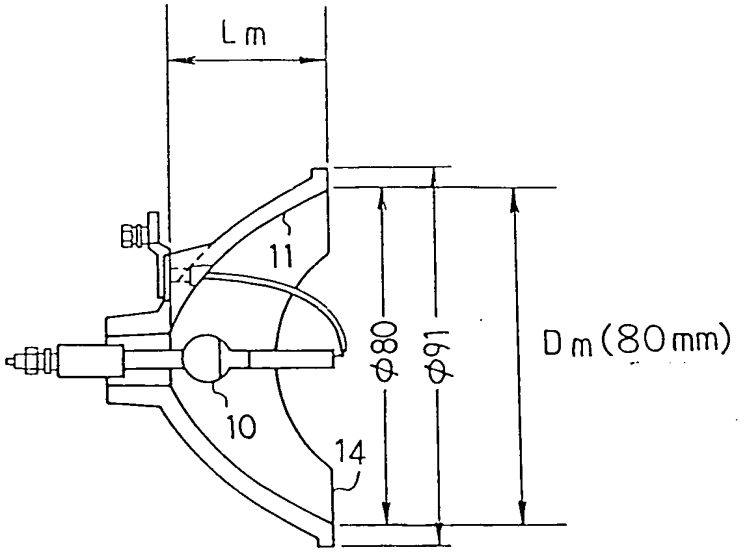


Fig.35

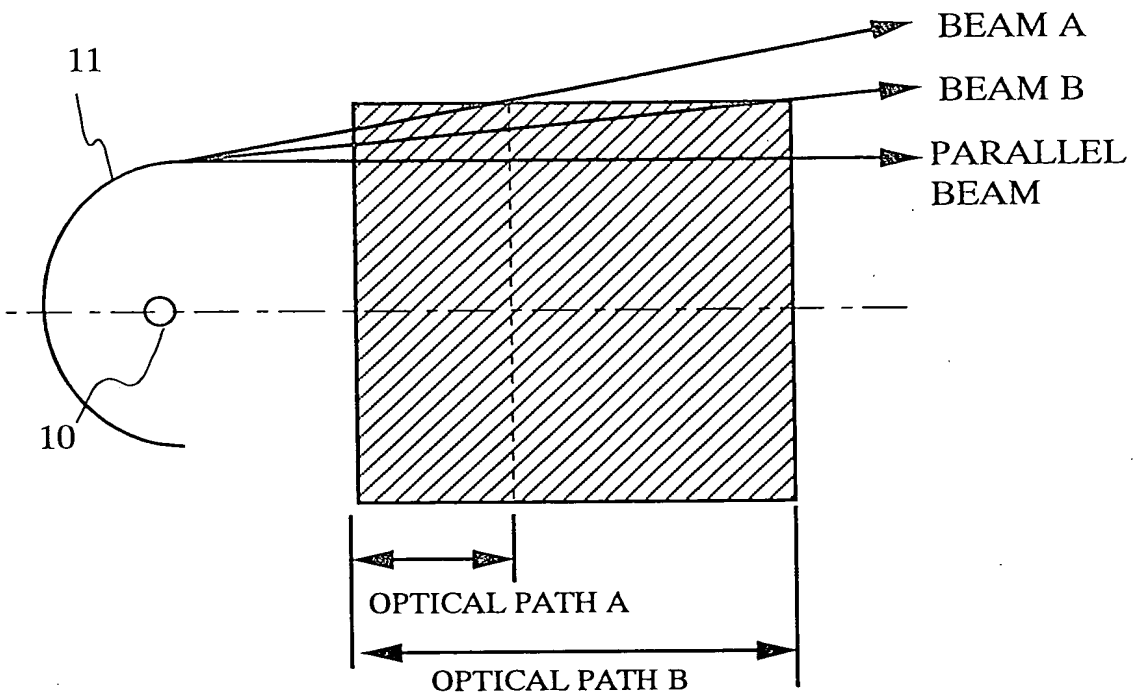

BEAM A
BEAM B
PARALLEL BEAM
11
10
OPTICAL PATH A
OPTICAL PATH B

Fig.36

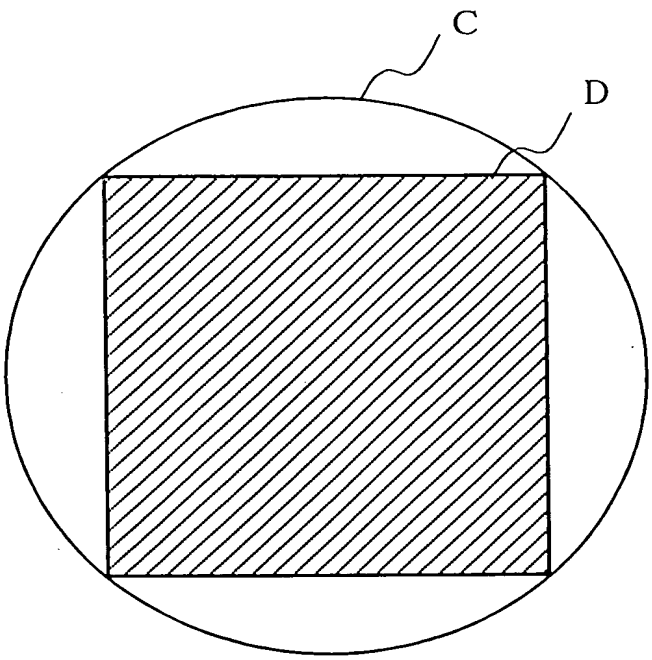


Fig.37

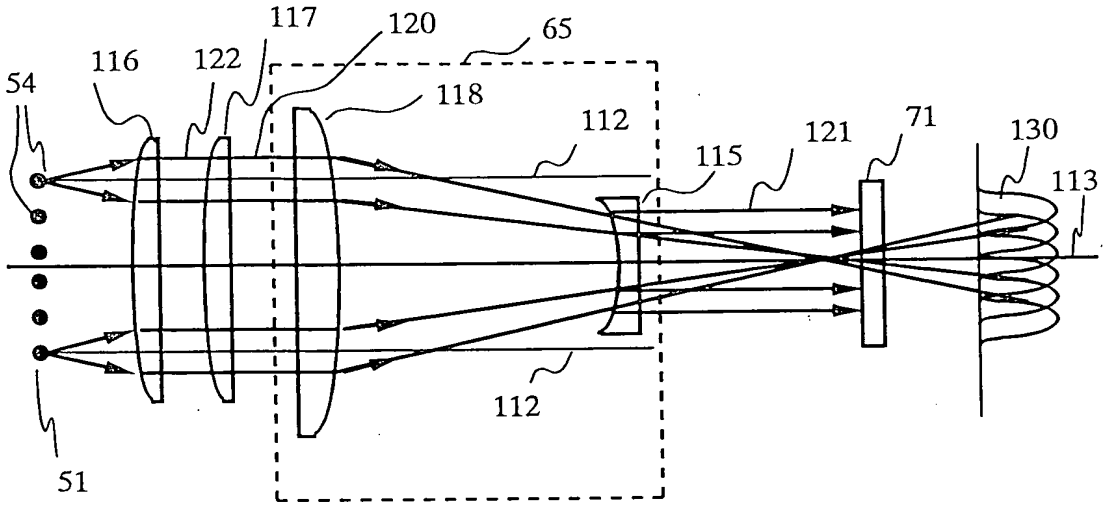

54
116
122
117
120
65
118
112
115
121
71
130
113
112
51

Fig.38

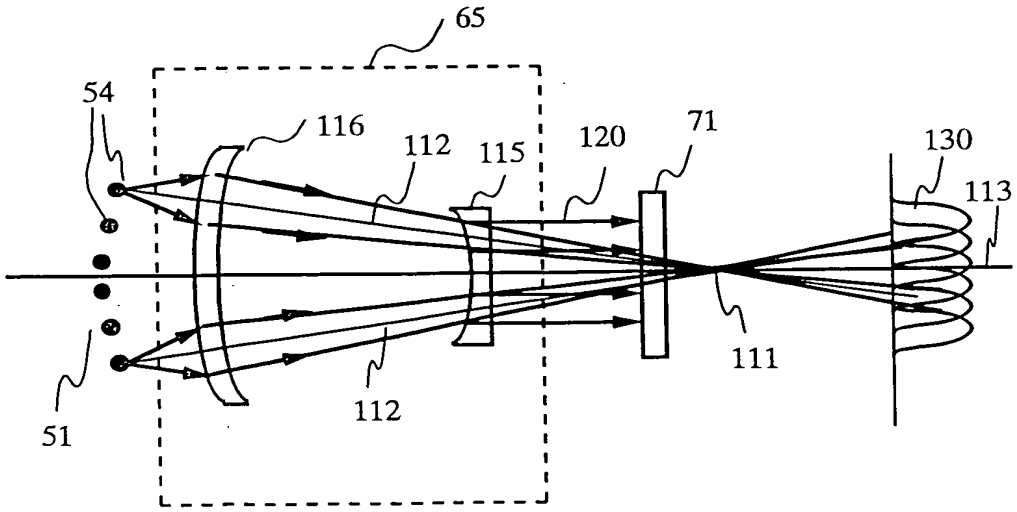

65
54
116
112
115
120
71
130
113
111
112
51

Fig.39

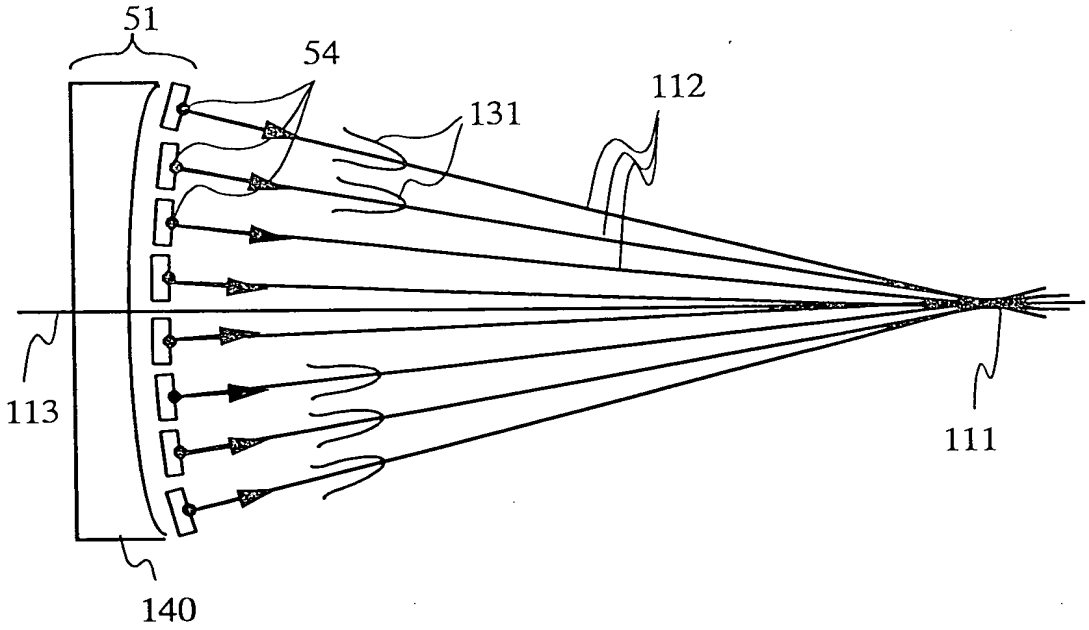

51
54
131
112
113
111
140

Fig.40

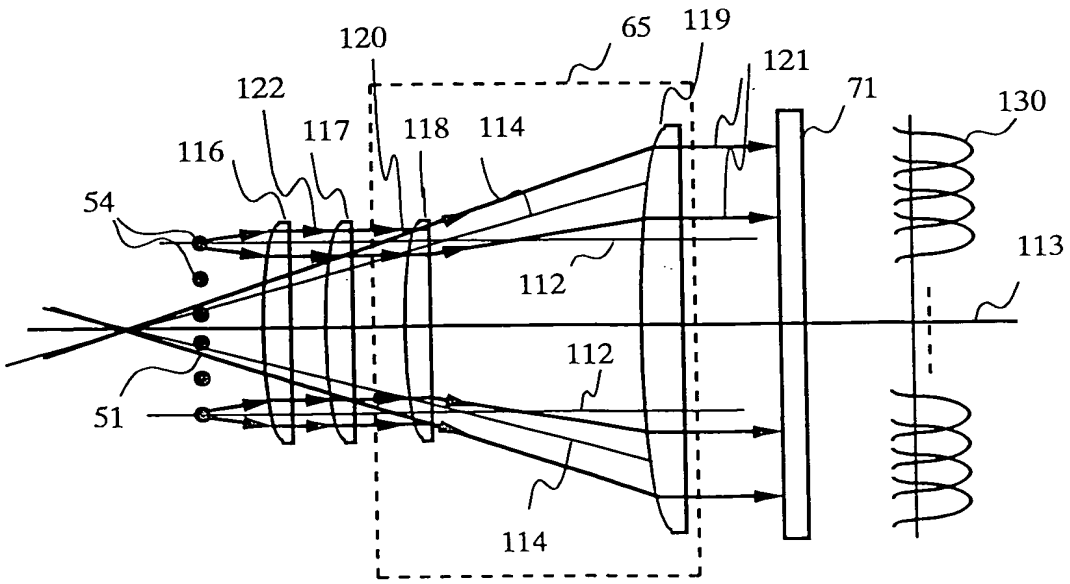

120
65
119
121
71
130
122
117
118
114
116
54
113
112
112
51
114

Fig.41

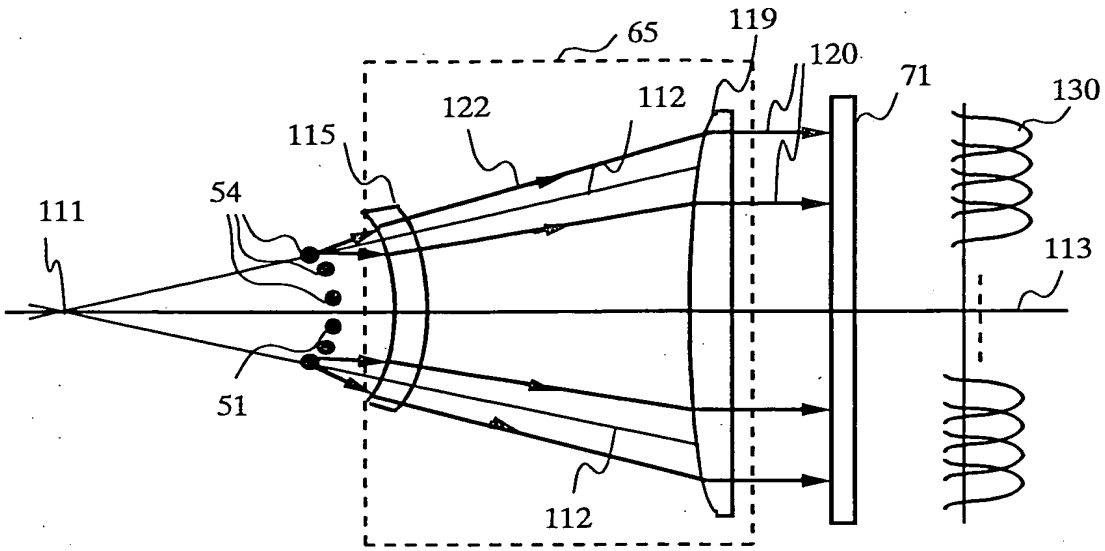

65
119
120
71
130
122
112
115
54
111
113
51
112

Fig.42

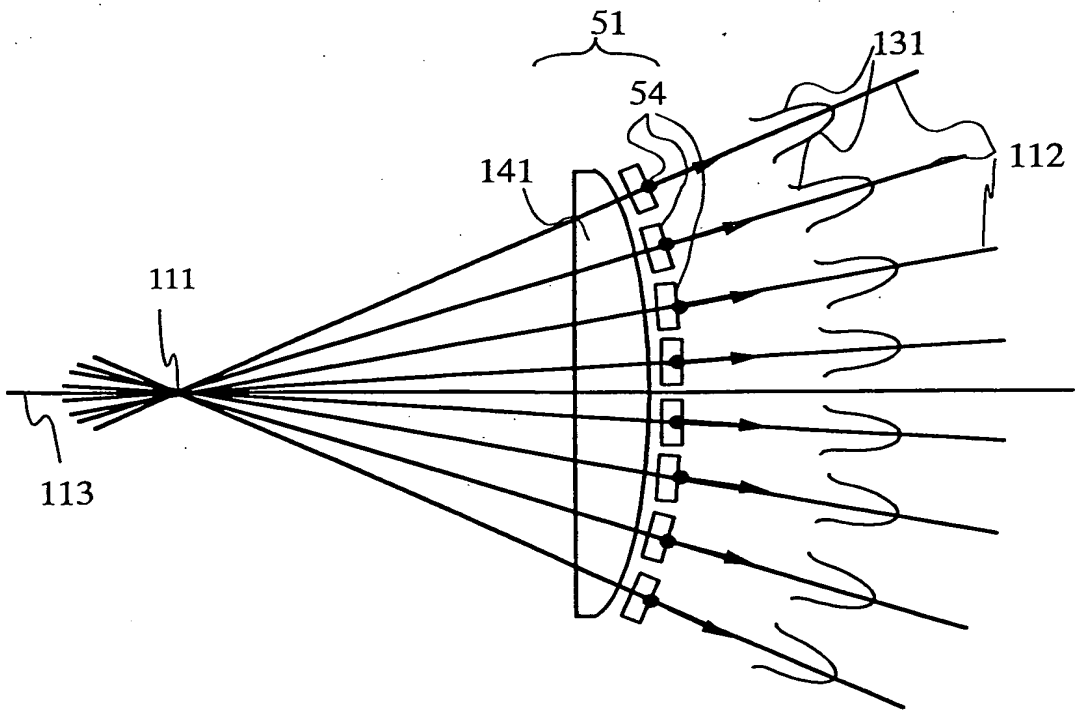

51
131
54
112
141
111
113

Fig.43

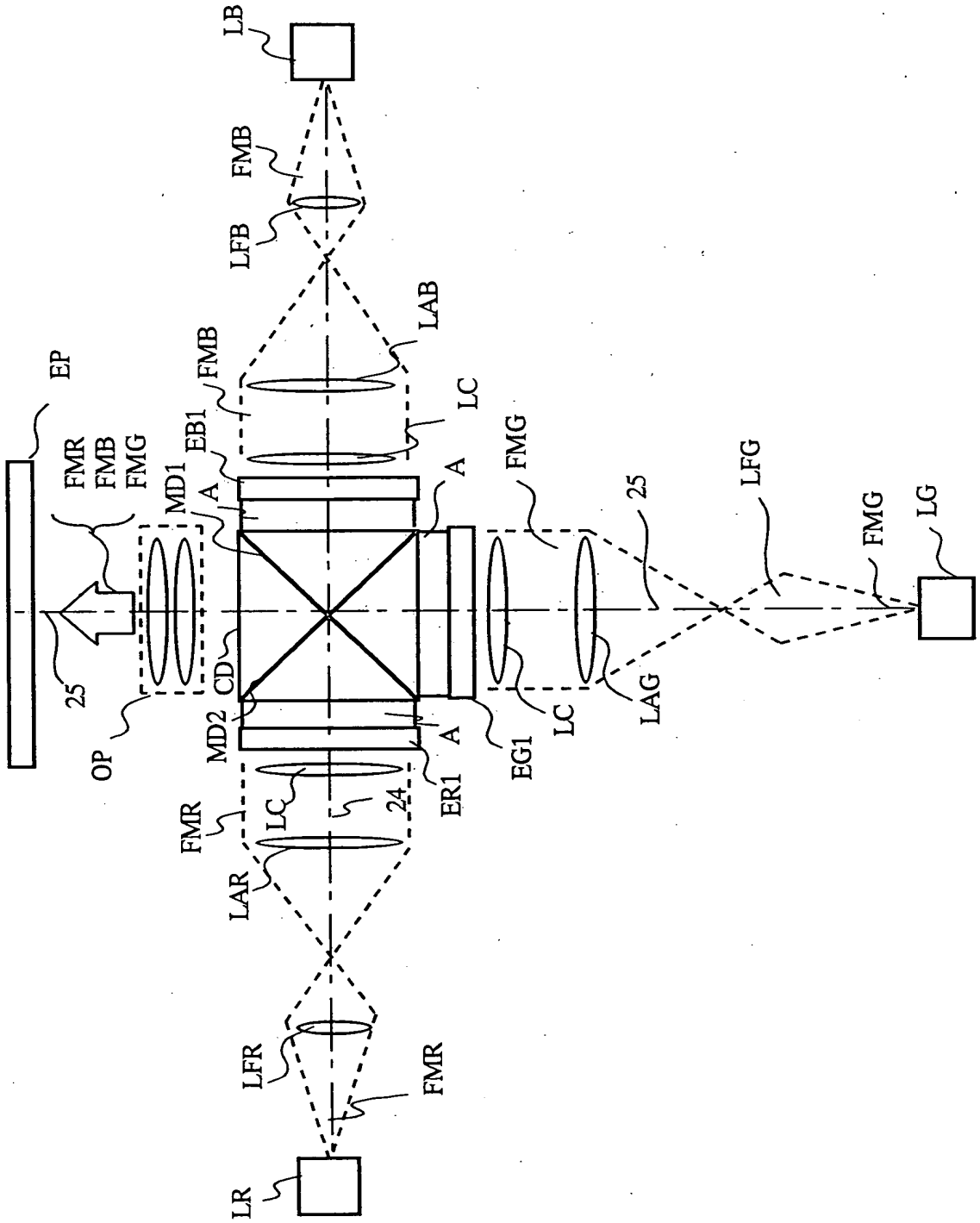

LB
FMB
LFB
LAB
FMB
LC
EP
FMR
FMB
FMG
EB1
MD1
A
FMG
25
LFG
FMG
LG
25
CD
MD2
A
EG1
LC
LAG
OP
ER1
24
FMR
LC
LAR
LFR
FMR
LR

Fig.44

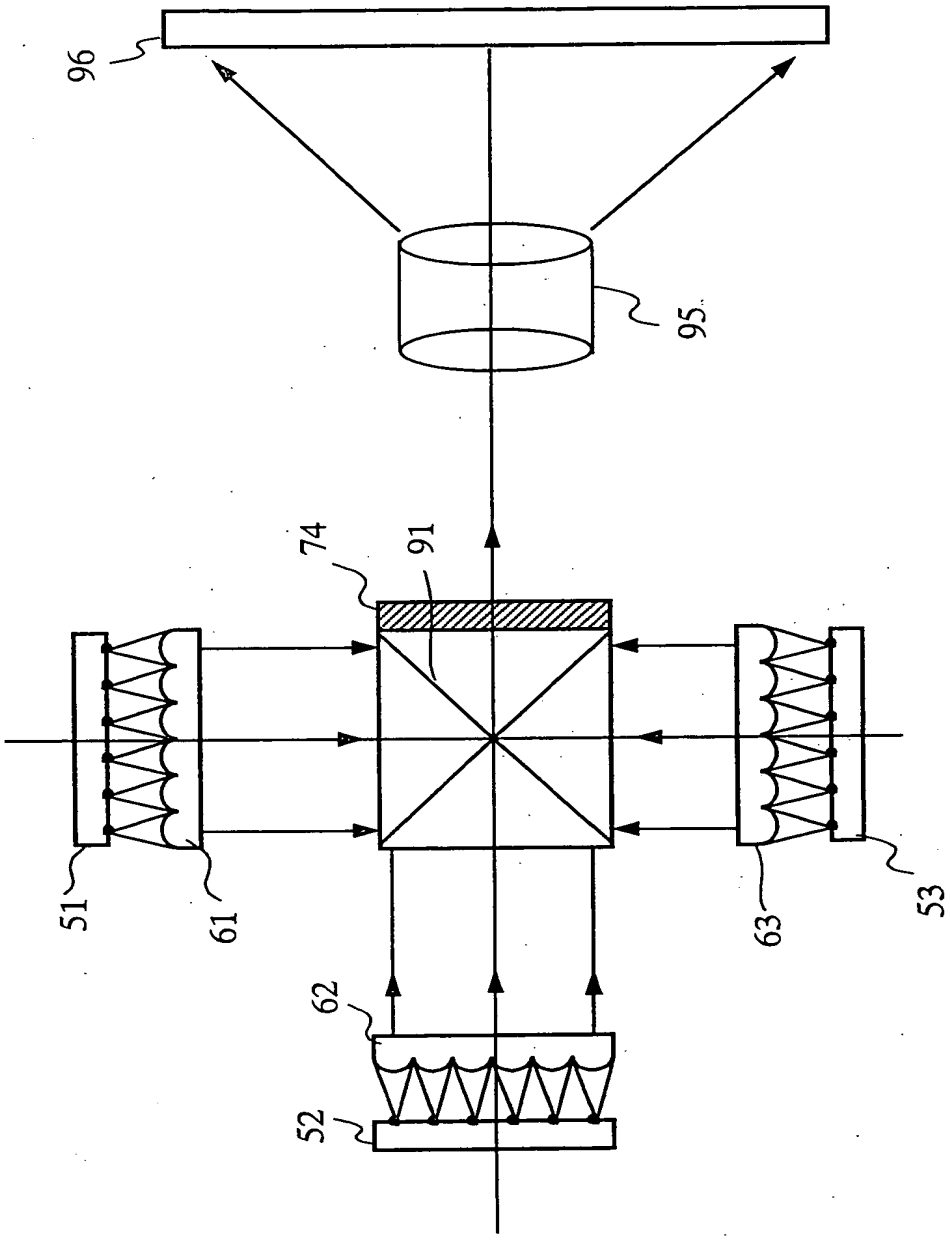


Fig.45

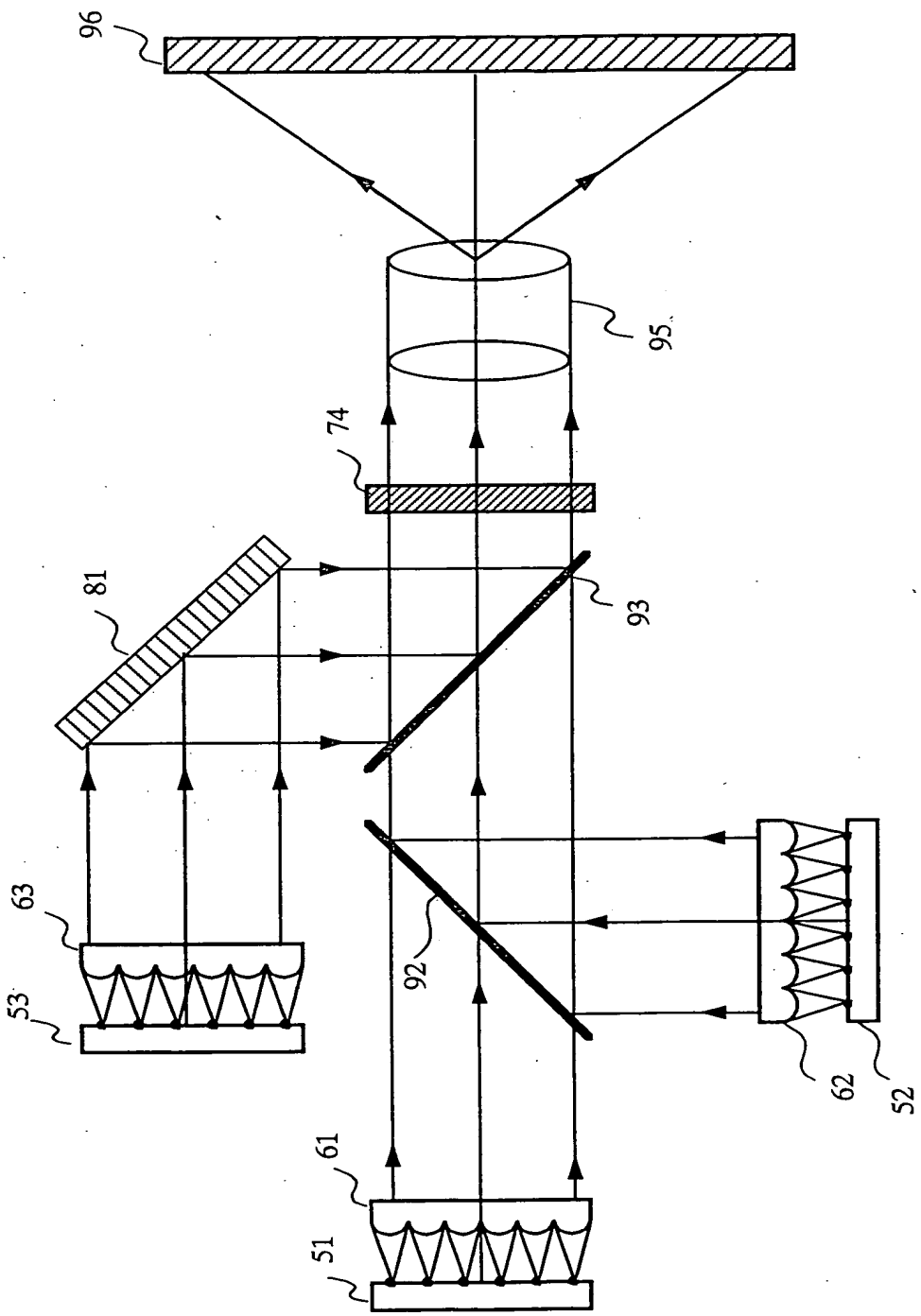


Fig.46

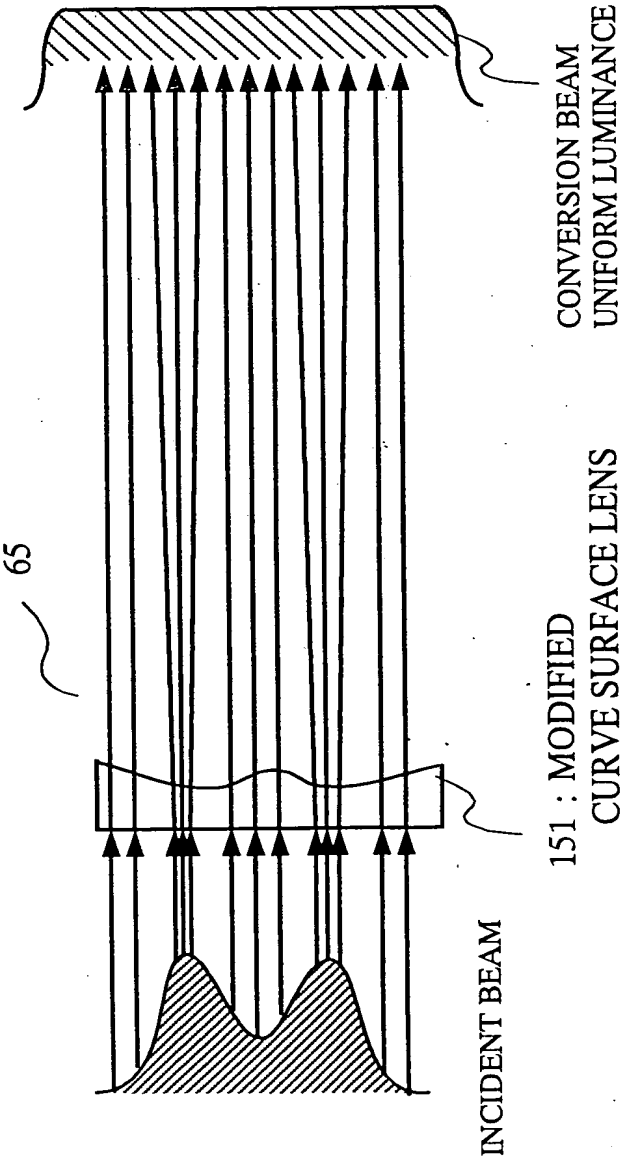

65
CONVERSION BEAM
UNIFORM LUMINANCE DISTRIBUTION
151 : MODIFIED
CURVE SURFACE LENS
INCIDENT BEAM

Fig.47

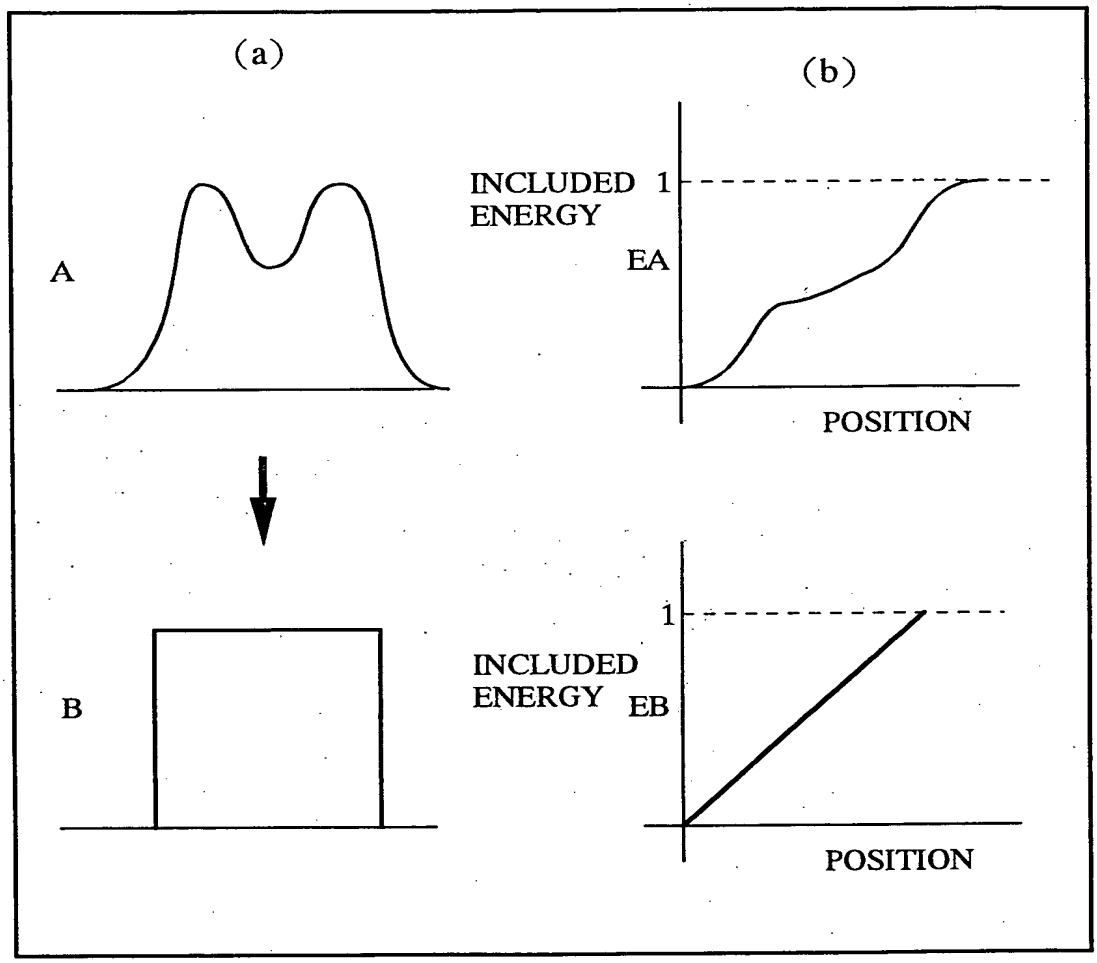

(a)
(b)
A
INCLUDED ENERGY
1
EA
POSITION
B
1
INCLUDED ENERGY
EB
POSITION

Fig.48

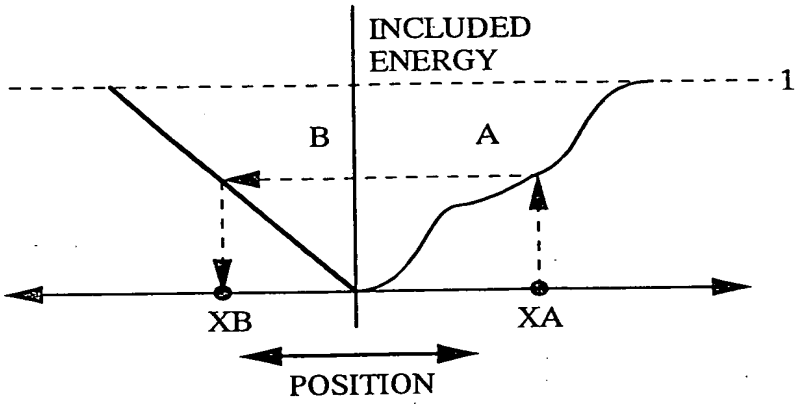
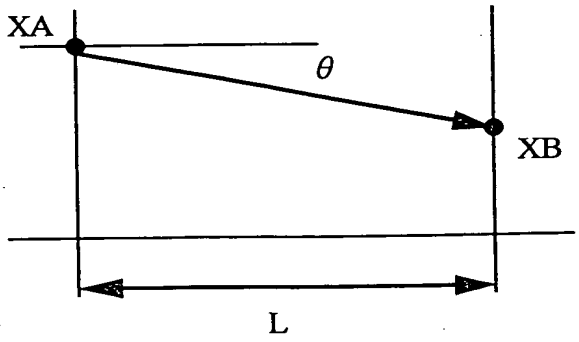


Fig.49



$$\tan\theta = \frac{X_A - X_B}{L} = \frac{X_A - T(X_A)}{L} = \theta\,(X_A, L)$$

Fig.50

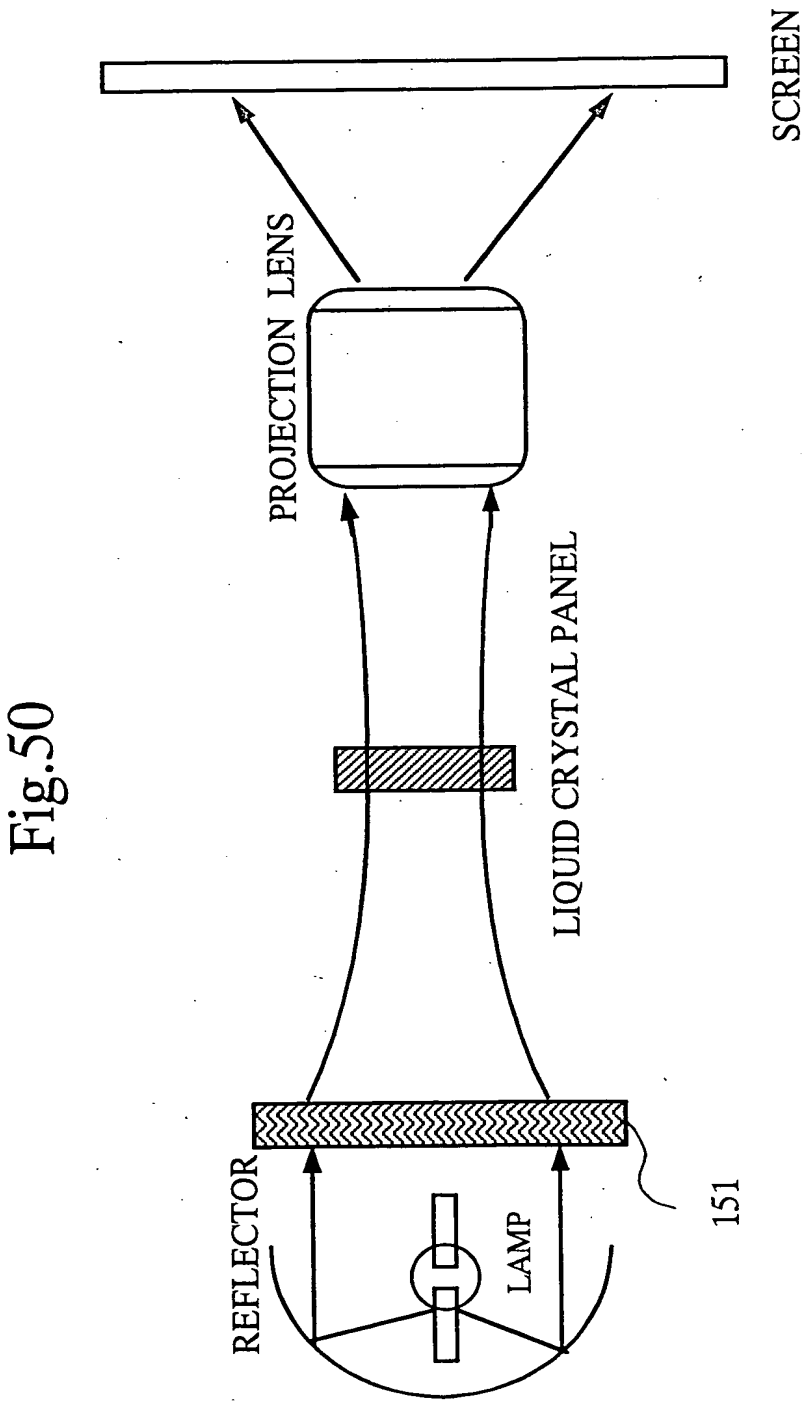

SCREEN
PROJECTION LENS
LIQUID CRYSTAL PANEL
REFLECTOR
LAMP
151

Fig.51

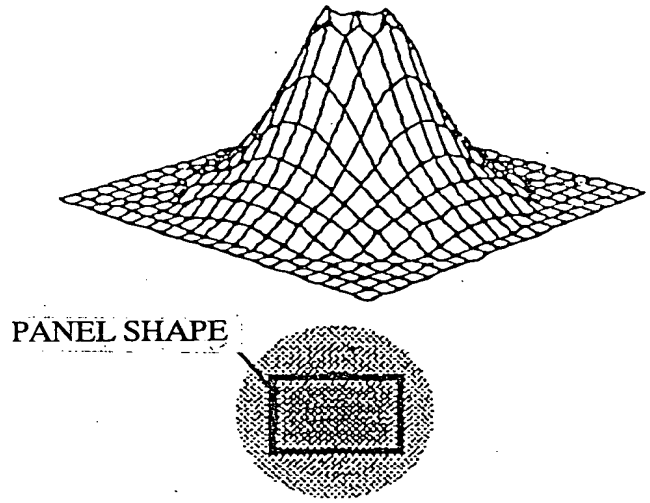


Fig.52

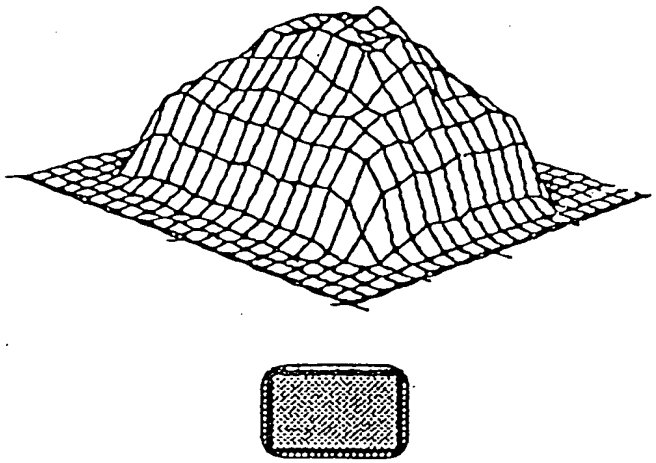


Fig.53

LAMP 150W、USING 1.3" COLOR PANEL	REGULAR LENS	MODIFIED CURVE SURFACE LENS
TOTAL LUMINOUS FLUX AMOUNT [lm]	121	261
CENTER ILLUMINANCE[Lux]	410	731
CIRCUMFERENTIAL ILLUMINANCE [Lux]	131	438
ILLUMINANCE RATIO OF CENTER TO CIRCUMFERENCE [%] (UNIFORMITY)	32	60

Fig.54

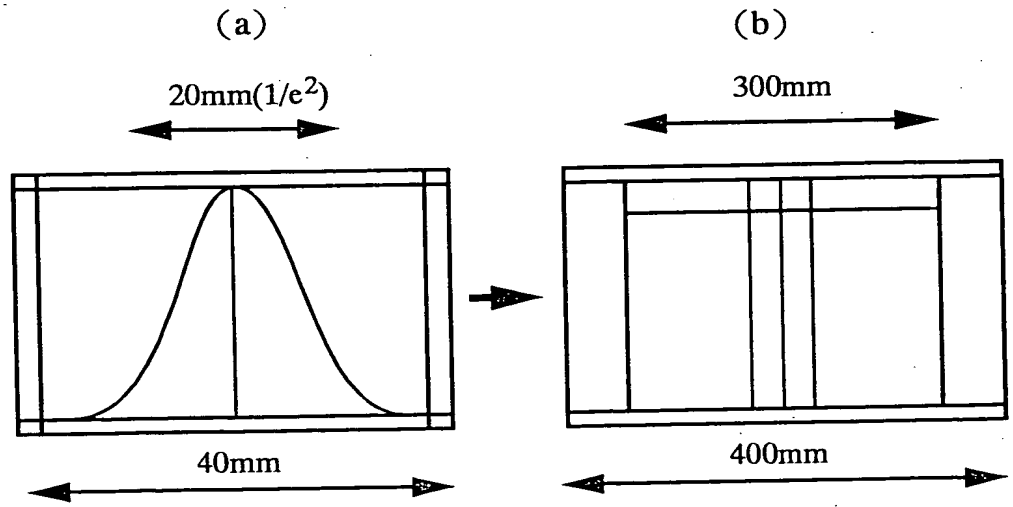


Fig.55

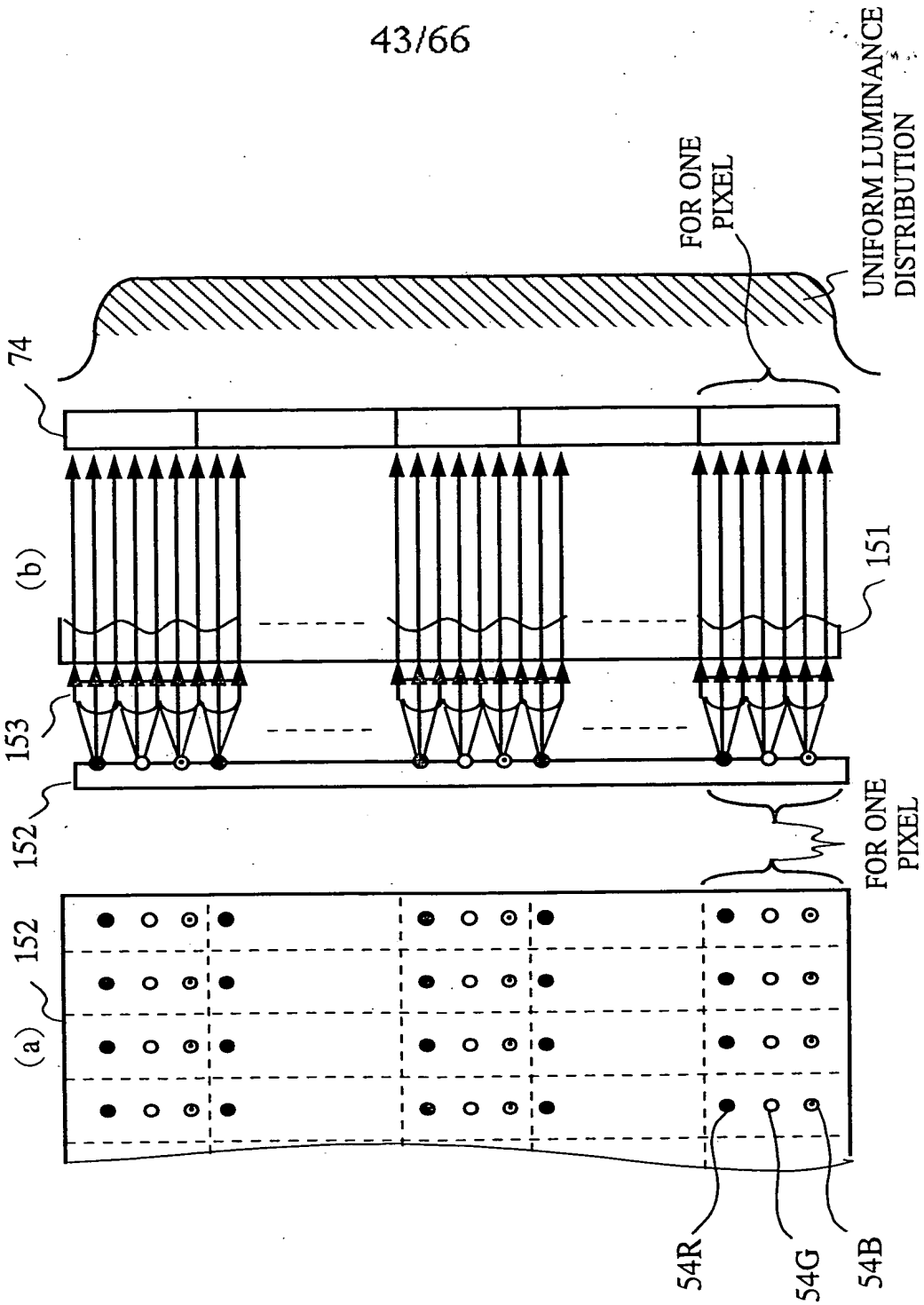

74
(b)
153
152
152
(a)
151
FOR ONE PIXEL
UNIFORM LUMINANCE DISTRIBUTION
FOR ONE PIXEL
54R
54G
54B

Fig.56

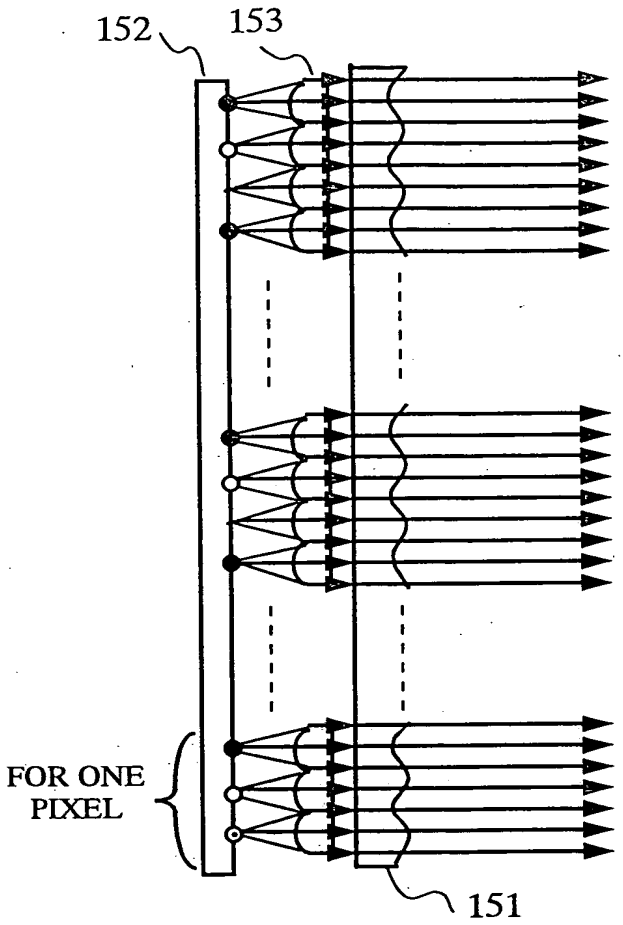


Fig.57

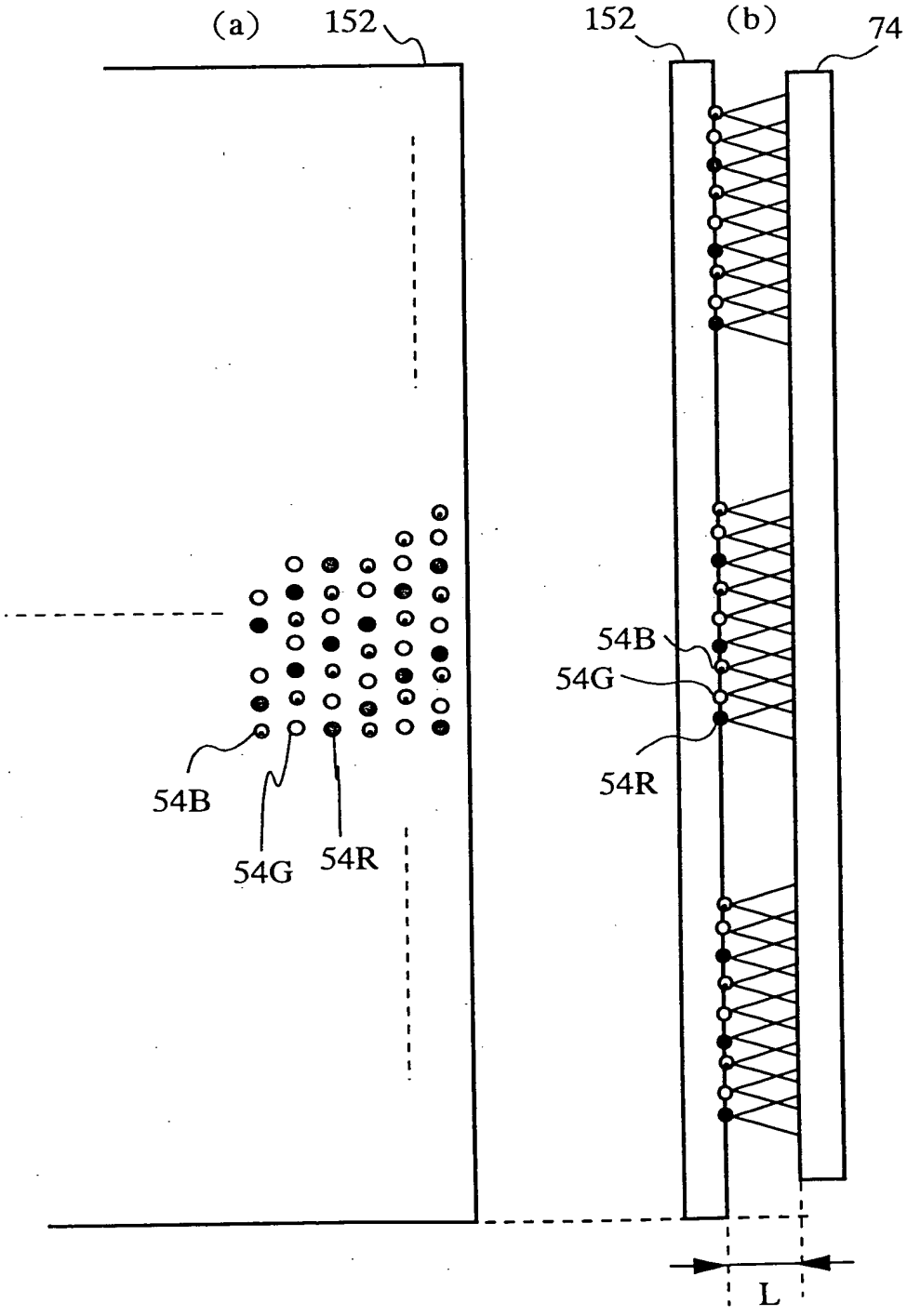


Fig.58

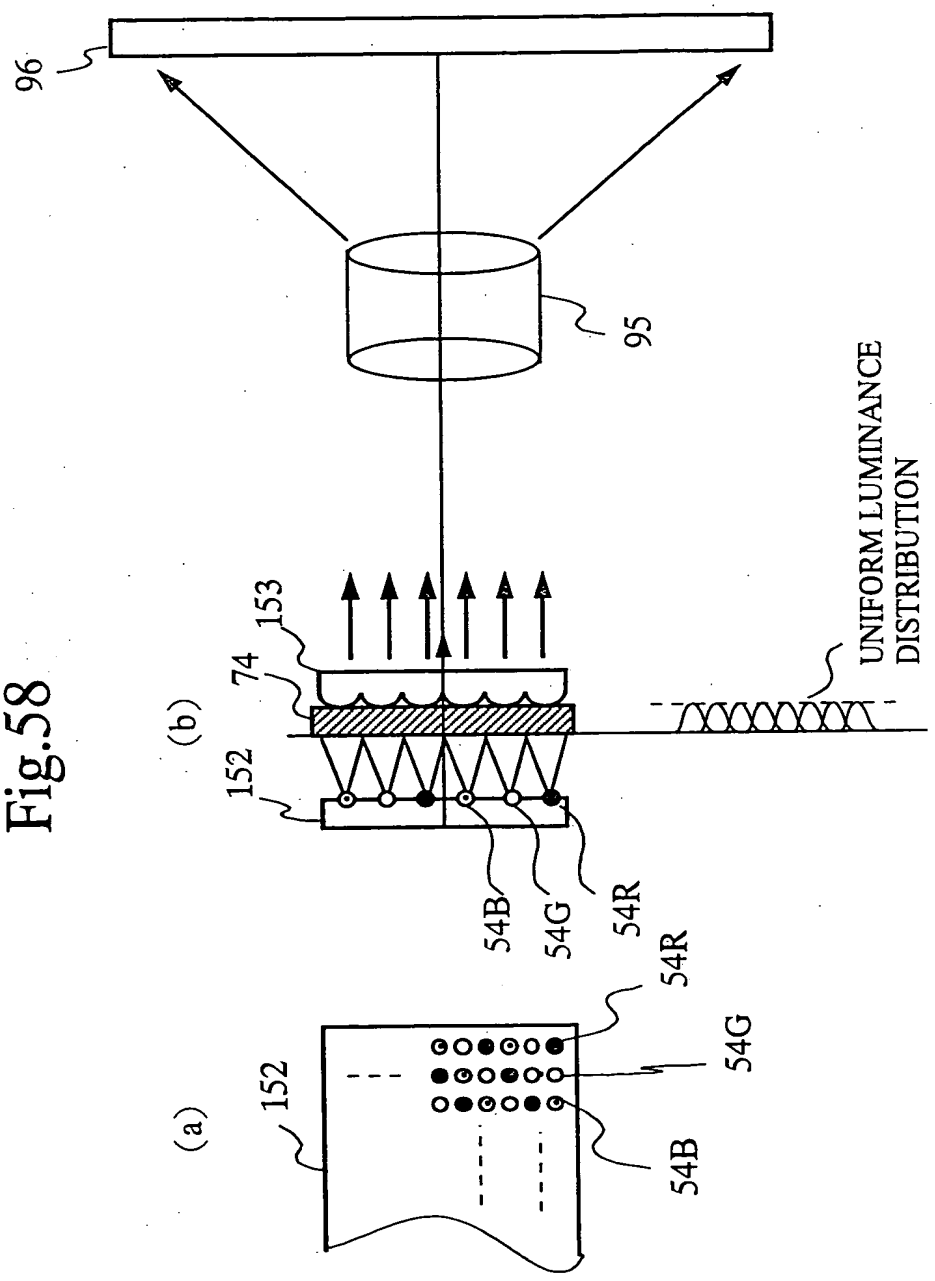

96
95
UNIFORM LUMINANCE DISTRIBUTION
153
74
(b)
152
54B
54G
54R
54R
54G
54B
(a)
152

Fig.59

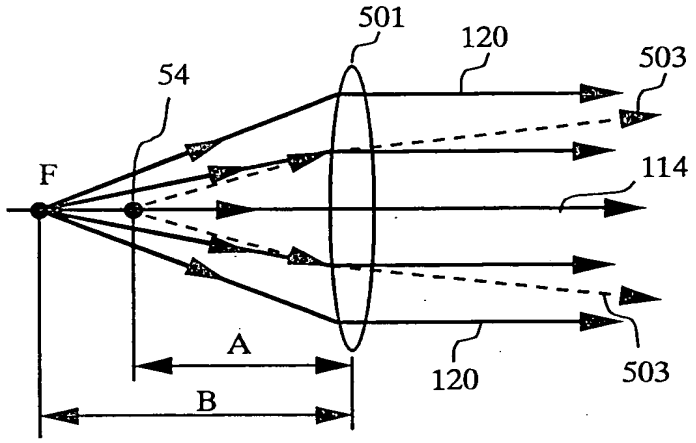

501
120
503
54
F
114
A
B
120
503

Fig.60

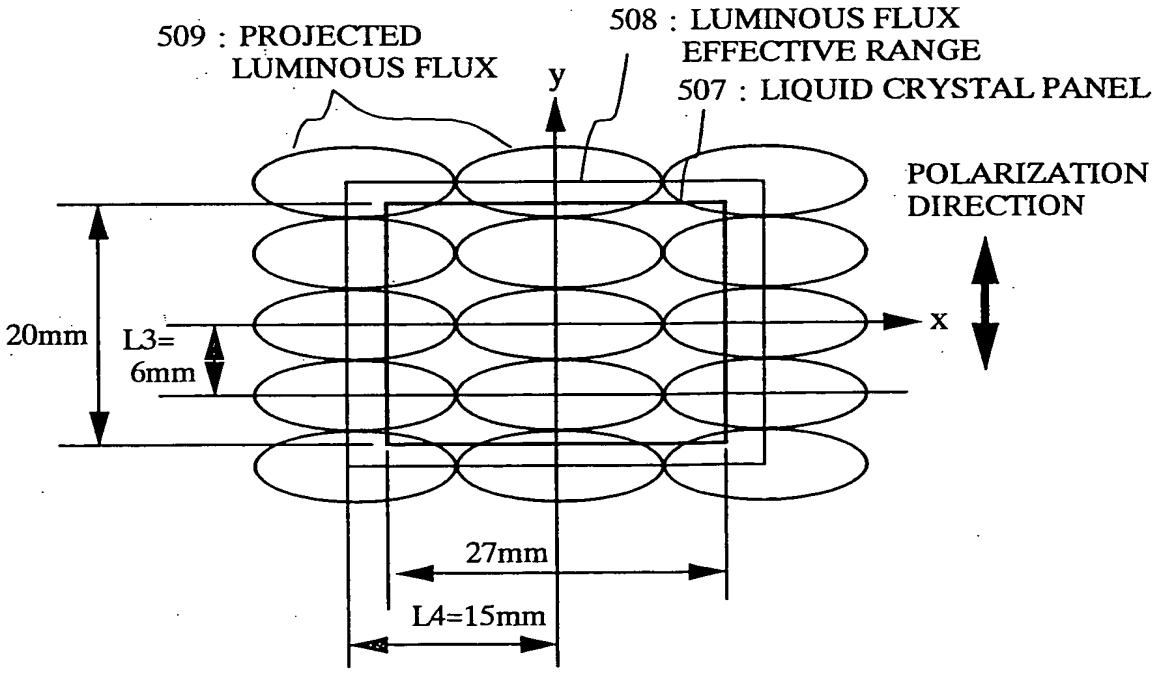

509 : PROJECTED LUMINOUS FLUX
508 : LUMINOUS FLUX EFFECTIVE RANGE
507 : LIQUID CRYSTAL PANEL
y
POLARIZATION DIRECTION
x
20mm
L3= 6mm
27mm
L4=15mm

Fig.61

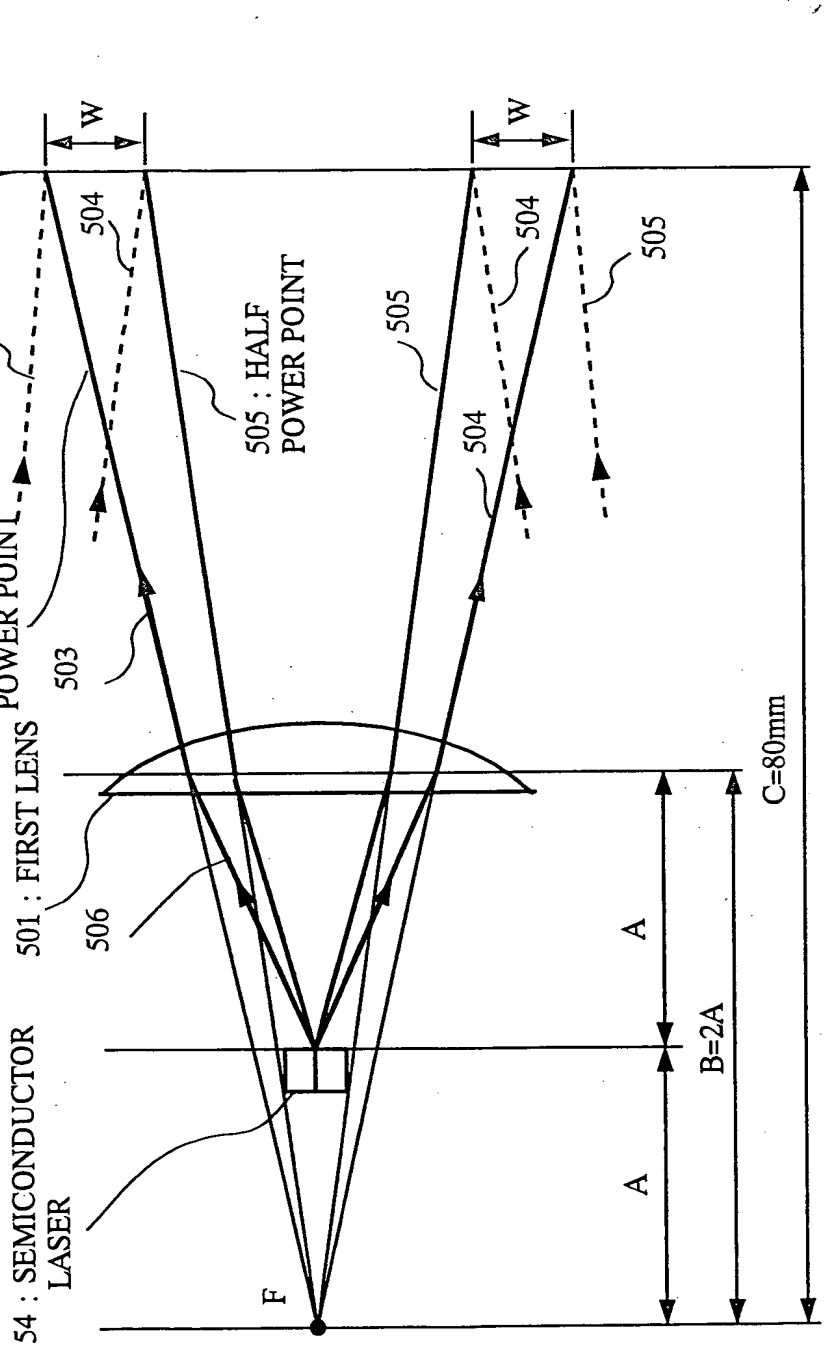
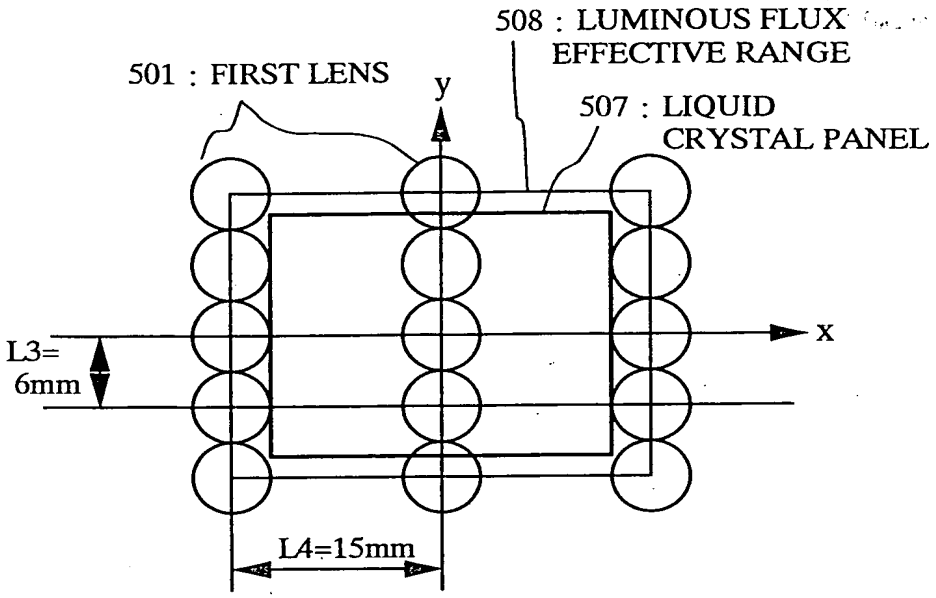

502 : SECOND LENS
W
W
504
504
505
505
505 : HALF POWER POINT
505
504
504
505
504 : 1/e² POWER POINT
503
501 : FIRST LENS
506
A
A
B=2A
C=80mm
54 : SEMICONDUCTOR LASER
F

Fig.62

DESIGN EXAMPLE (UNIT : mm)

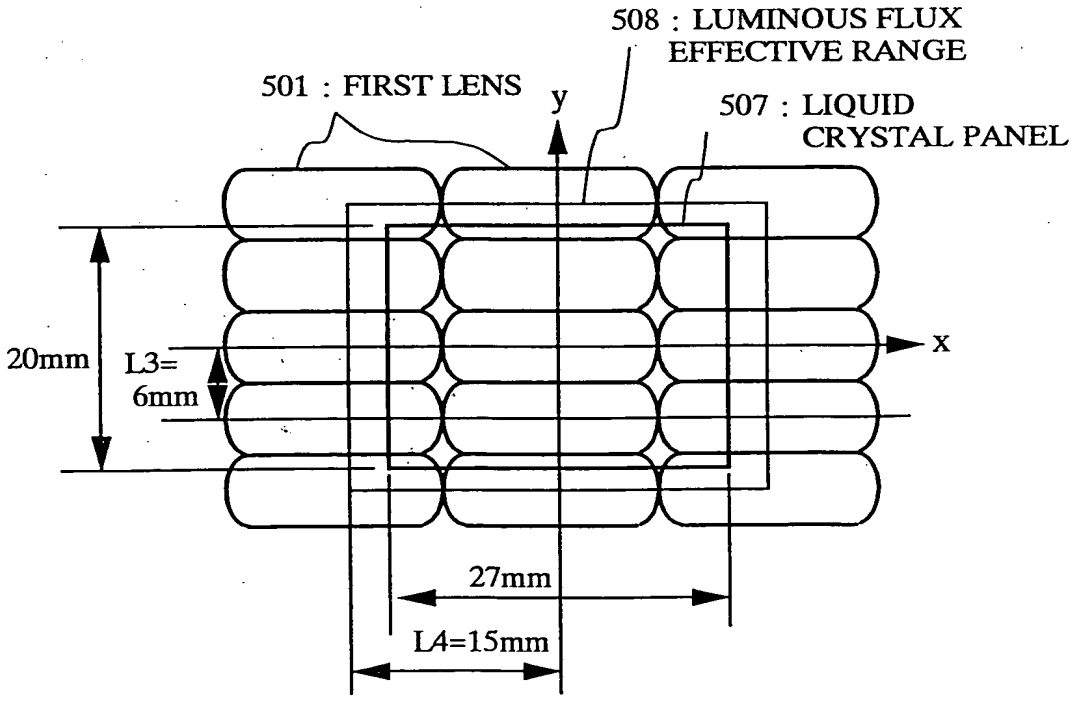
No.	A	B	FIRST LENS				SECOND LENS	
			NARROW ANGLE		WIDE ANGLE		NARROW ANGLE	WIDE ANGLE
			HALF(L1)	$1/e^2$	HALF(L2)	$1/e^2$	HALF(L3)	HALF(L4)
1	9	18	1.333	2.26	3.371	5.733	6	15
2	23	46	3.41	5.79	8.8	15		

Fig.63



No.1DESIGN , FIRST LENS ALLOCATION(CIRCLE LENS)

Fig.64



No.2 DESIGN , FIRST LENS ALLOCATION
(A PART OF CIRCLE LENS BEING CUT)

Fig.65

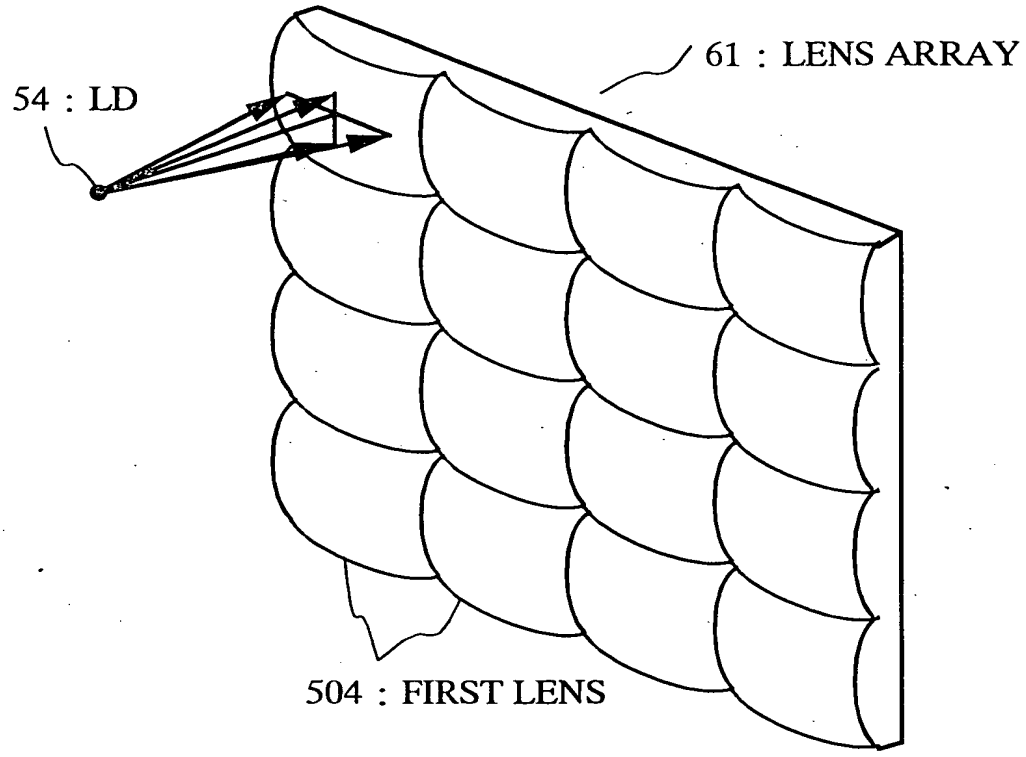


Fig.66

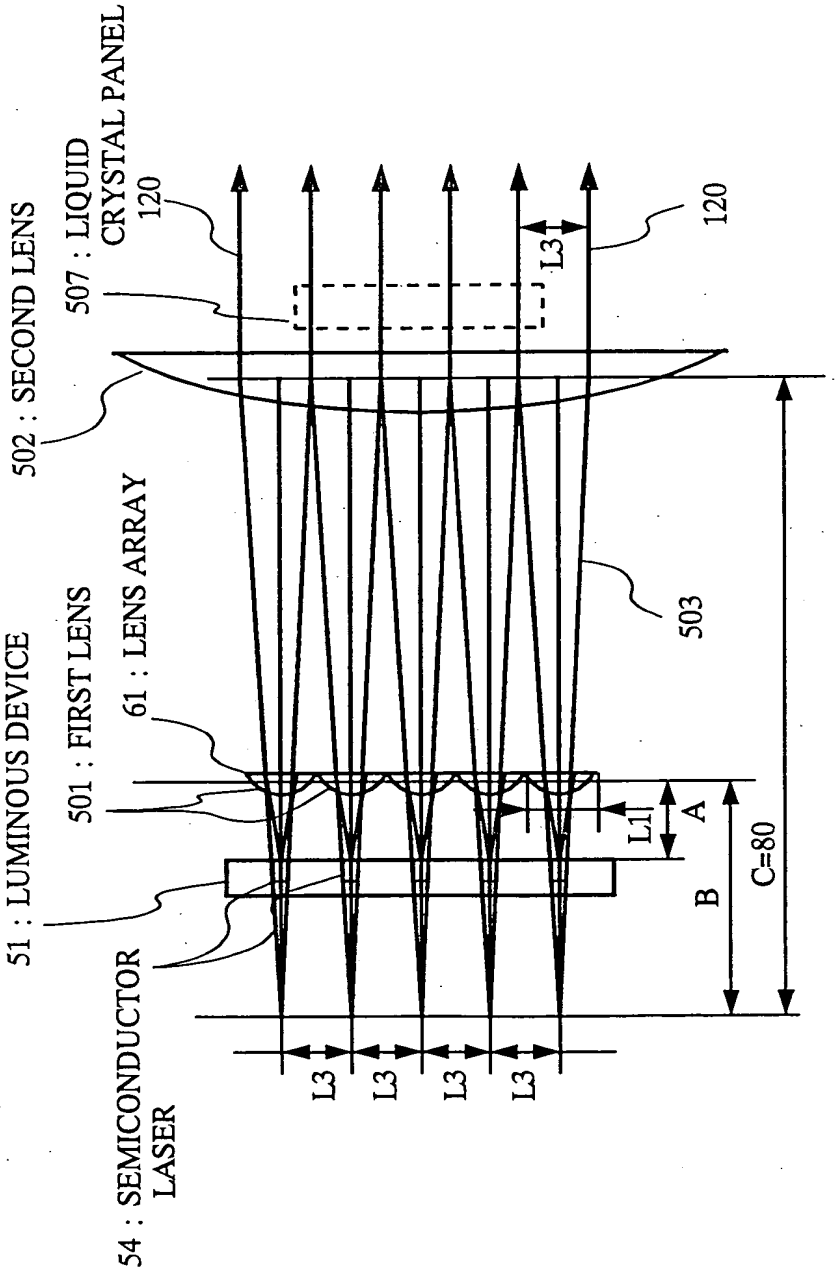

54 : SEMICONDUCTOR LASER
51 : LUMINOUS DEVICE
501 : FIRST LENS
61 : LENS ARRAY
502 : SECOND LENS
507 : LIQUID CRYSTAL PANEL
120
120
503
L3
L3
L3
L3
L3
L1
A
B
C=80

Fig.67

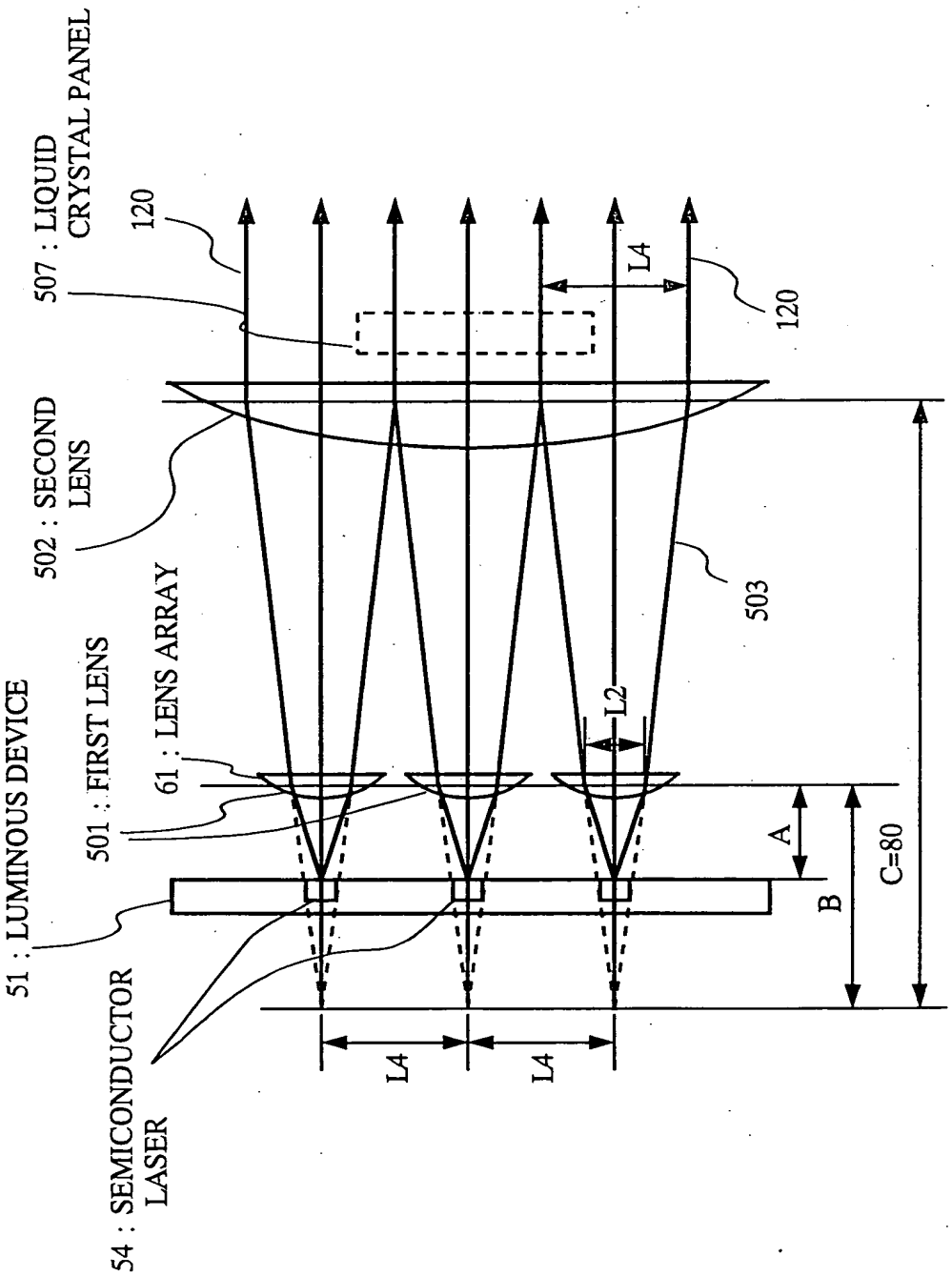

507 : LIQUID CRYSTAL PANEL
120
502 : SECOND LENS
501 : FIRST LENS
61 : LENS ARRAY
51 : LUMINOUS DEVICE
54 : SEMICONDUCTOR LASER
L4
L4
L4
120
503
L2
A
B
C=80

Fig.68

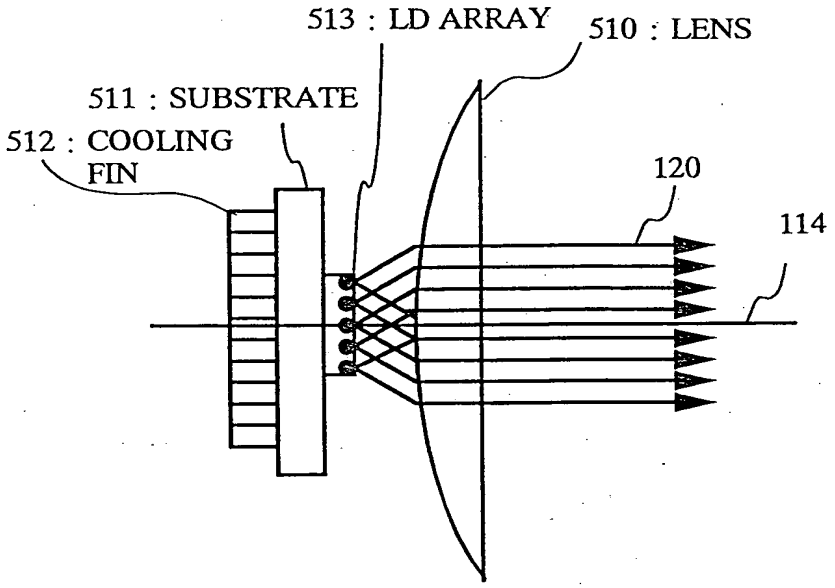

513 : LD ARRAY
510 : LENS
511 : SUBSTRATE
512 : COOLING FIN
120
114

Fig.69

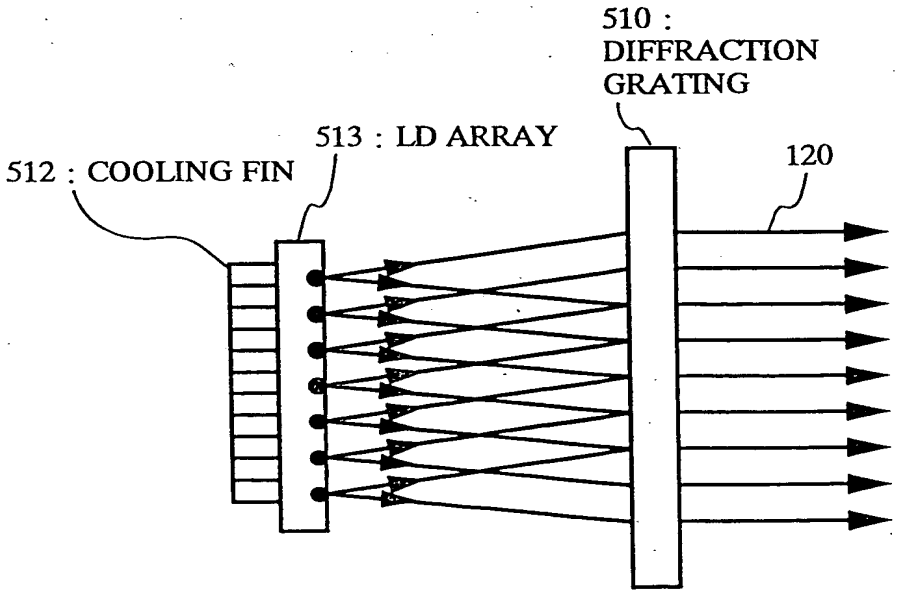

510 : DIFFRACTION GRATING
513 : LD ARRAY
512 : COOLING FIN
120

Fig.70

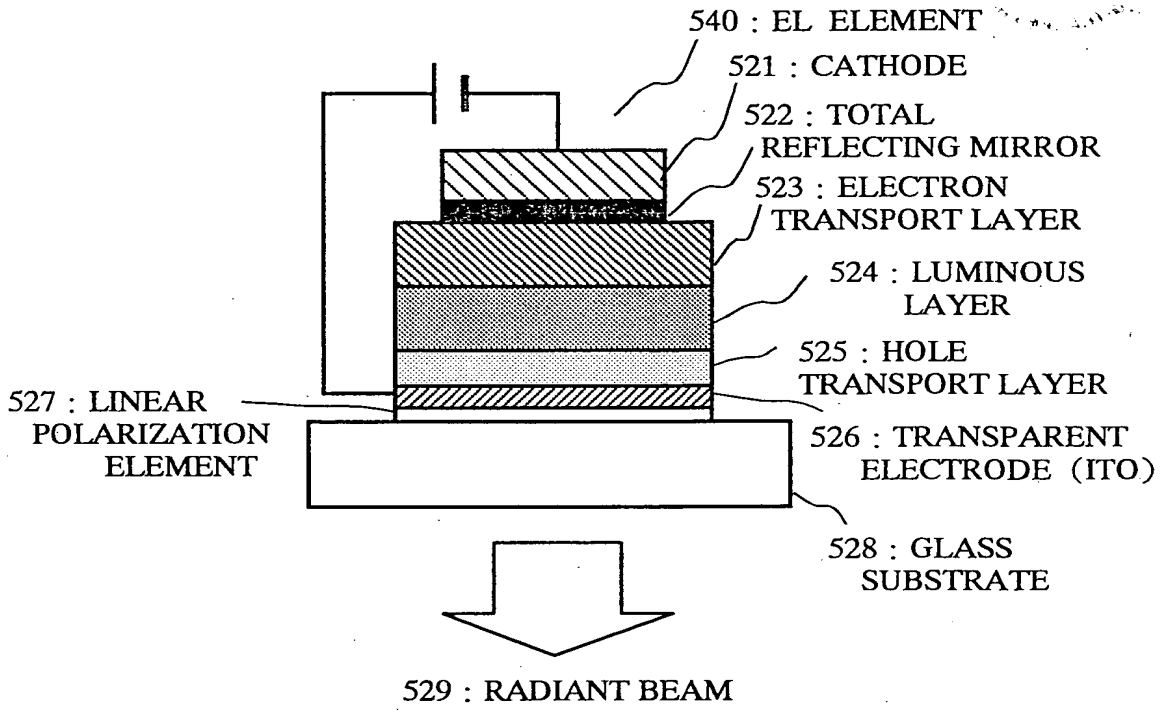

540 : EL ELEMENT
521 : CATHODE
522 : TOTAL REFLECTING MIRROR
523 : ELECTRON TRANSPORT LAYER
524 : LUMINOUS LAYER
525 : HOLE TRANSPORT LAYER
527 : LINEAR POLARIZATION ELEMENT
526 : TRANSPARENT ELECTRODE (ITO)
528 : GLASS SUBSTRATE
529 : RADIANT BEAM

Fig.71

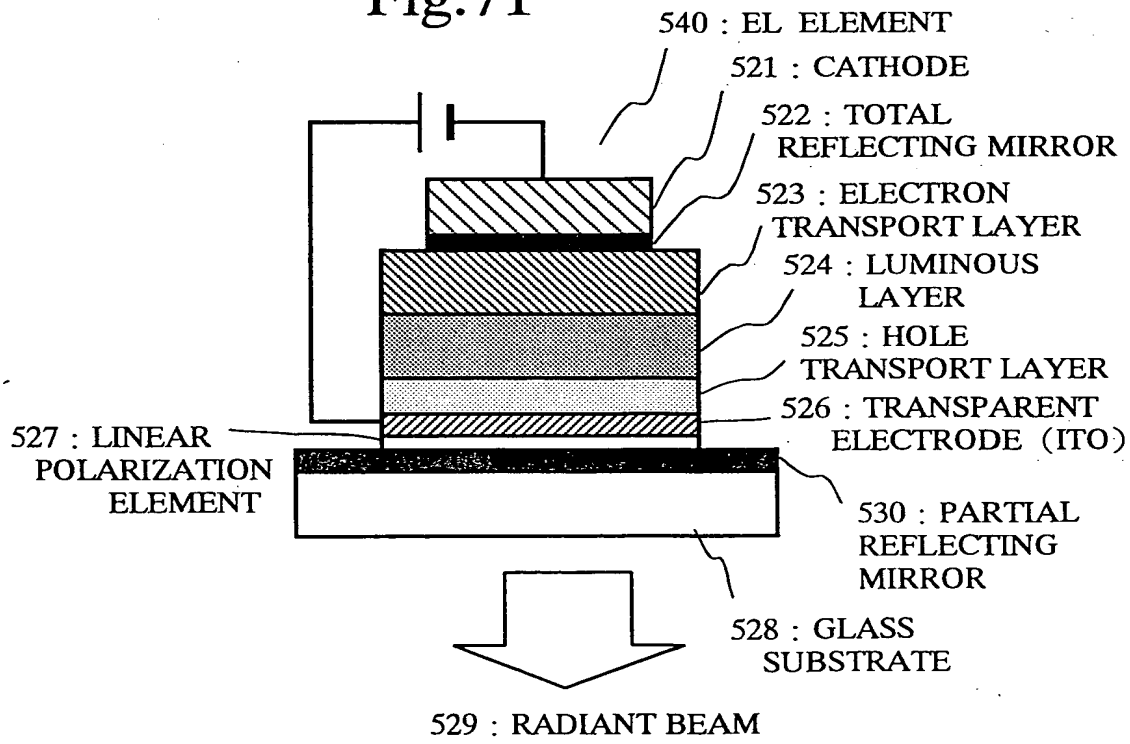

540 : EL ELEMENT
521 : CATHODE
522 : TOTAL REFLECTING MIRROR
523 : ELECTRON TRANSPORT LAYER
524 : LUMINOUS LAYER
525 : HOLE TRANSPORT LAYER
526 : TRANSPARENT ELECTRODE (ITO)
527 : LINEAR POLARIZATION ELEMENT
530 : PARTIAL REFLECTING MIRROR
528 : GLASS SUBSTRATE
529 : RADIANT BEAM

Fig.72

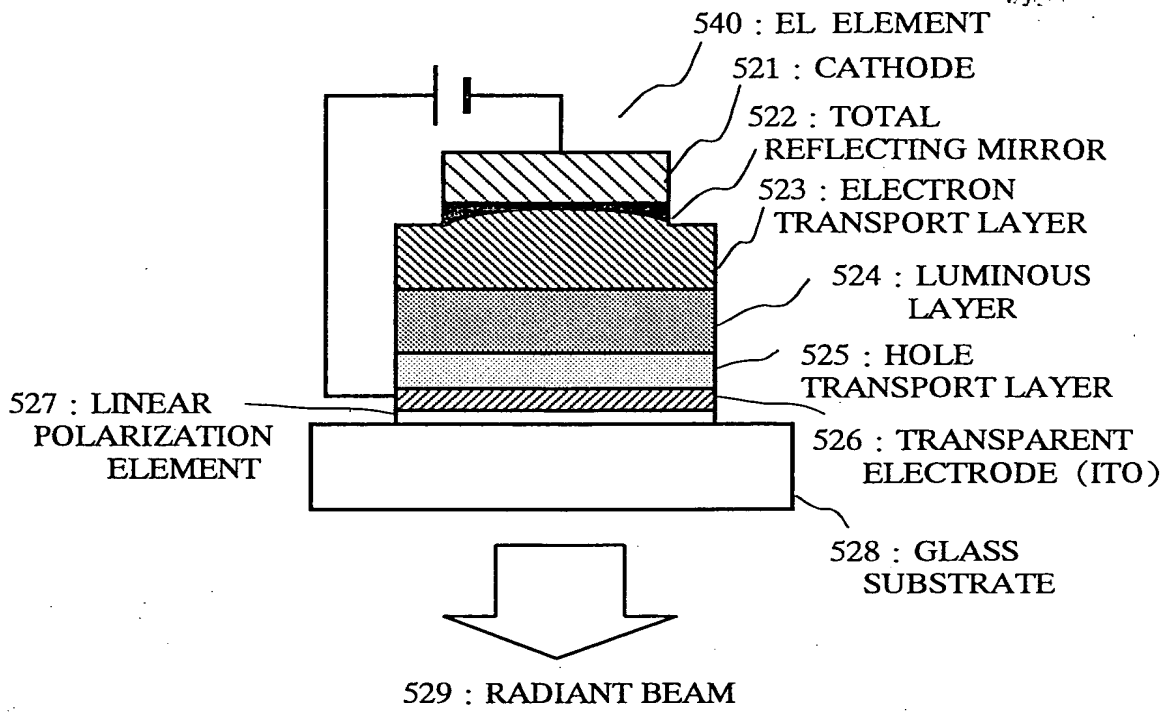

540 : EL ELEMENT
521 : CATHODE
522 : TOTAL REFLECTING MIRROR
523 : ELECTRON TRANSPORT LAYER
524 : LUMINOUS LAYER
525 : HOLE TRANSPORT LAYER
526 : TRANSPARENT ELECTRODE (ITO)
527 : LINEAR POLARIZATION ELEMENT
528 : GLASS SUBSTRATE
529 : RADIANT BEAM

Fig.73

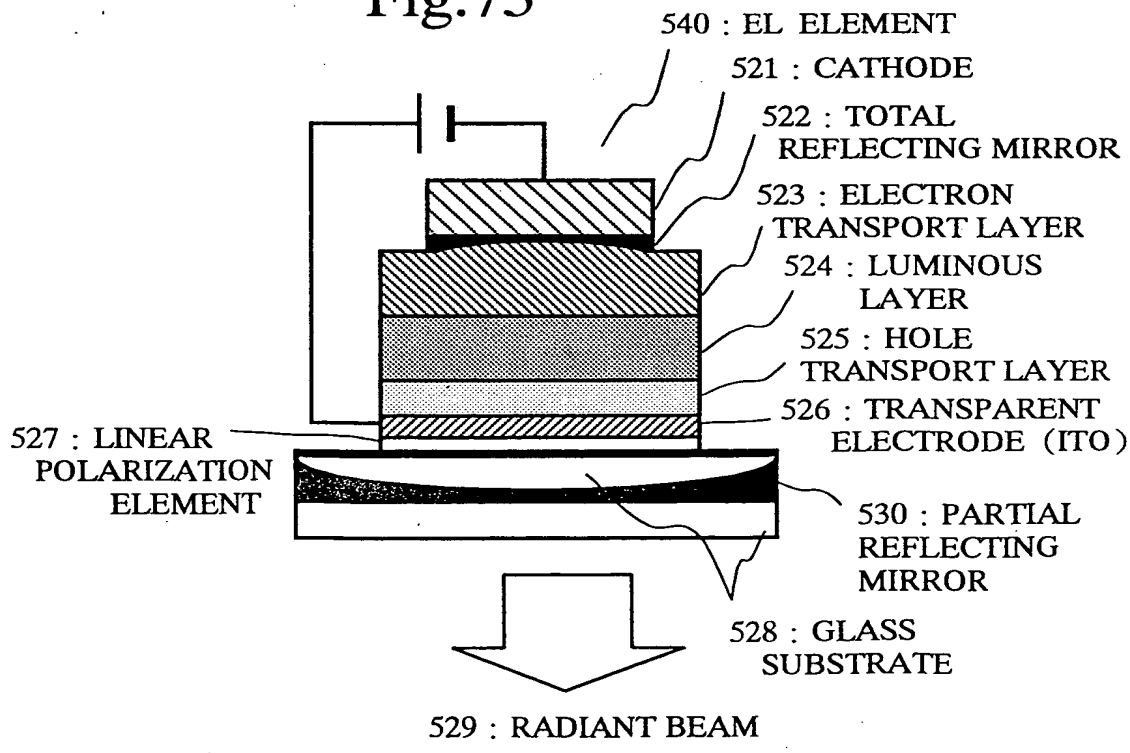

540 : EL ELEMENT
521 : CATHODE
522 : TOTAL REFLECTING MIRROR
523 : ELECTRON TRANSPORT LAYER
524 : LUMINOUS LAYER
525 : HOLE TRANSPORT LAYER
526 : TRANSPARENT ELECTRODE (ITO)
527 : LINEAR POLARIZATION ELEMENT
530 : PARTIAL REFLECTING MIRROR
528 : GLASS SUBSTRATE
529 : RADIANT BEAM

Fig.74

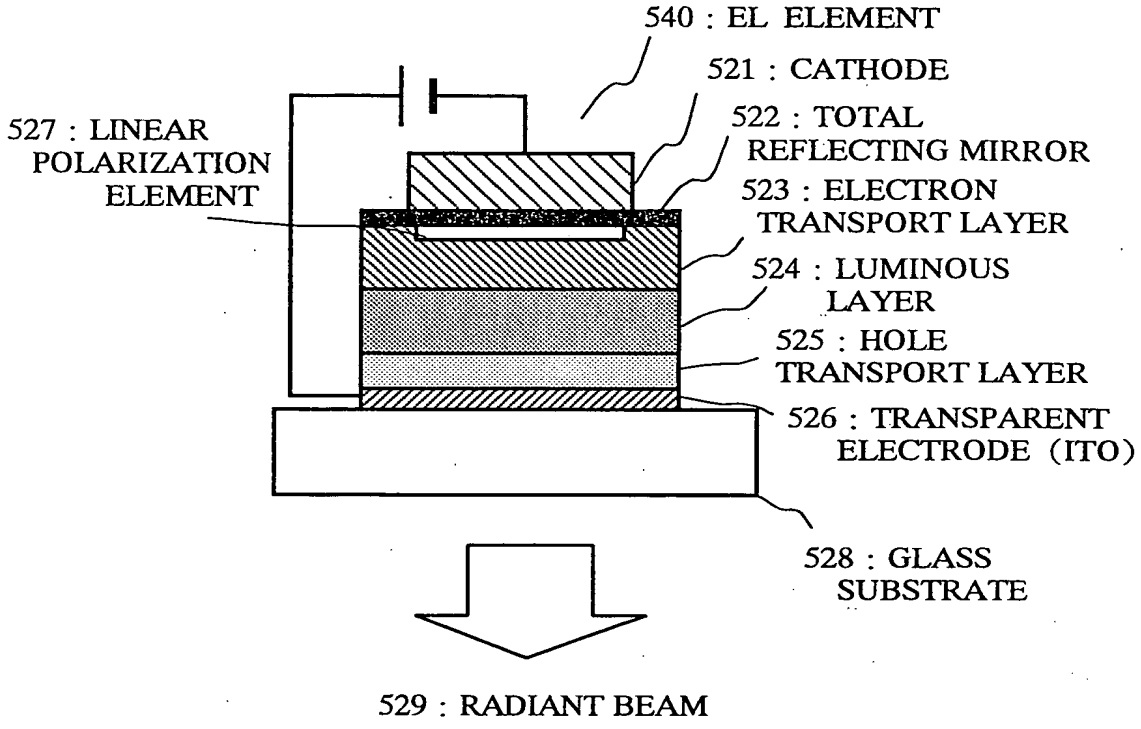

540 : EL ELEMENT
521 : CATHODE
522 : TOTAL REFLECTING MIRROR
523 : ELECTRON TRANSPORT LAYER
524 : LUMINOUS LAYER
525 : HOLE TRANSPORT LAYER
526 : TRANSPARENT ELECTRODE (ITO)
527 : LINEAR POLARIZATION ELEMENT
528 : GLASS SUBSTRATE
529 : RADIANT BEAM

Fig.75

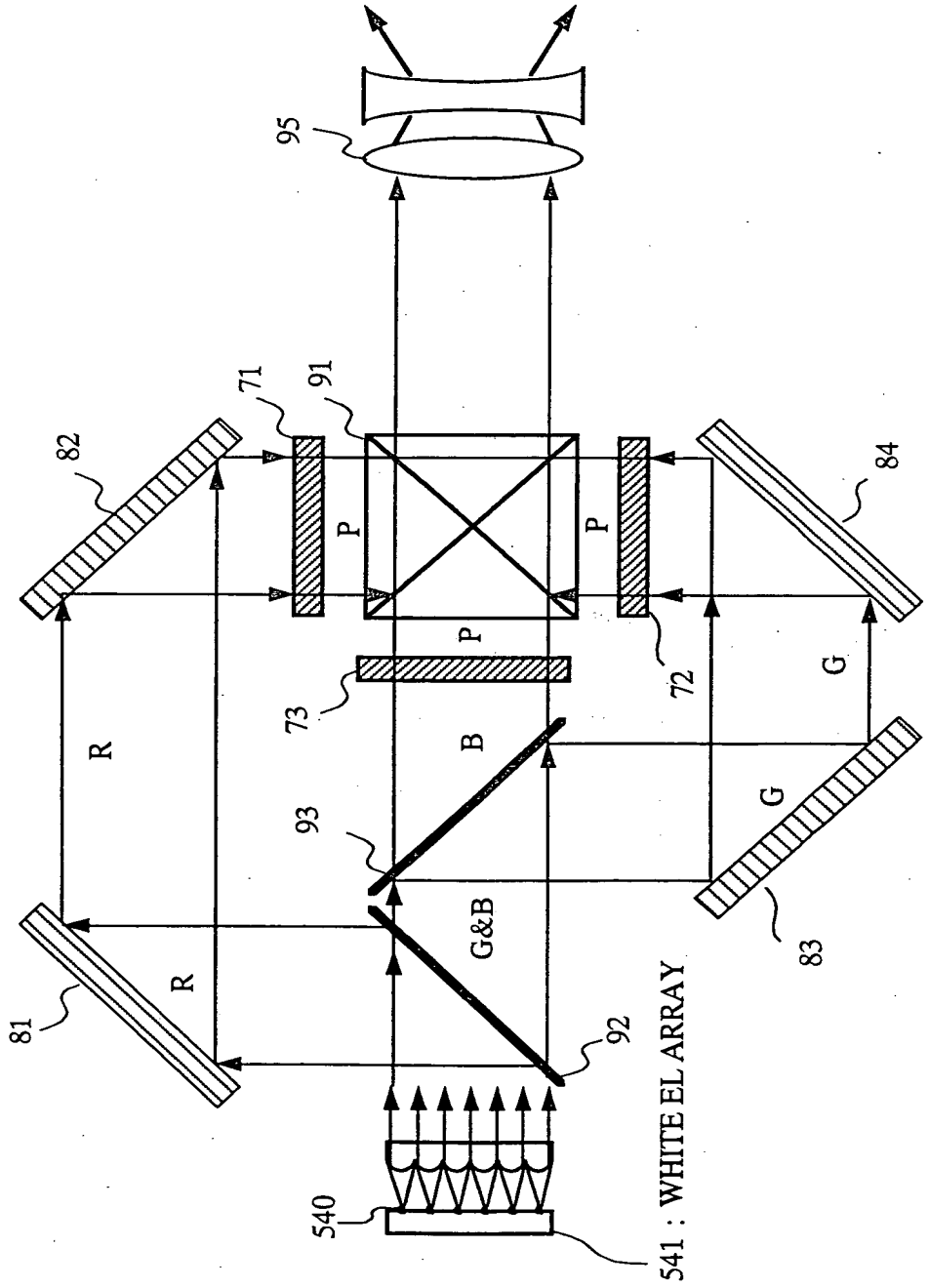

95
71
91
82
84
P
P
P
73
72
R
B
G
93
G
G&B
R
81
92
83
540
541 : WHITE EL ARRAY

Fig.76

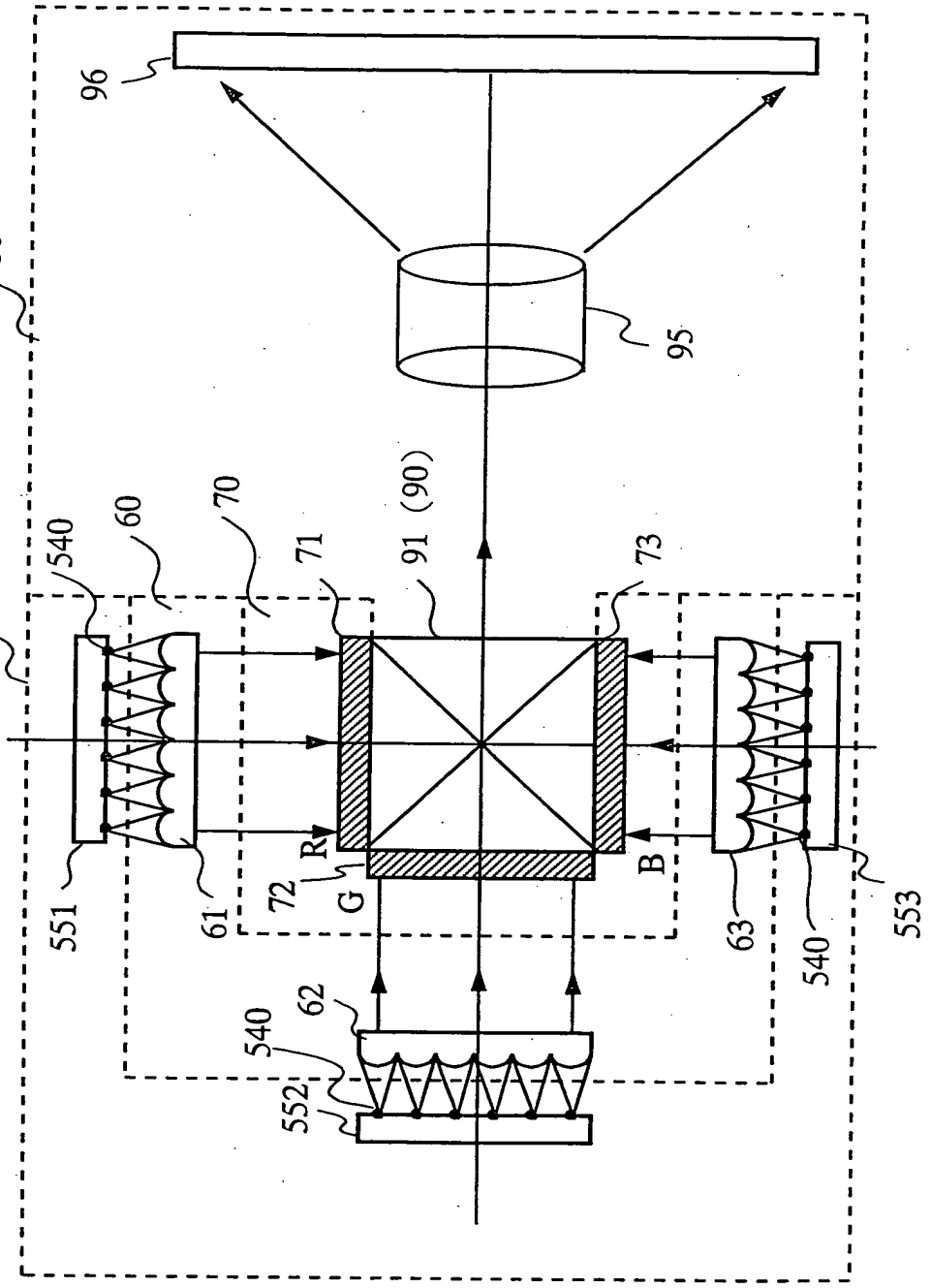


Fig.77

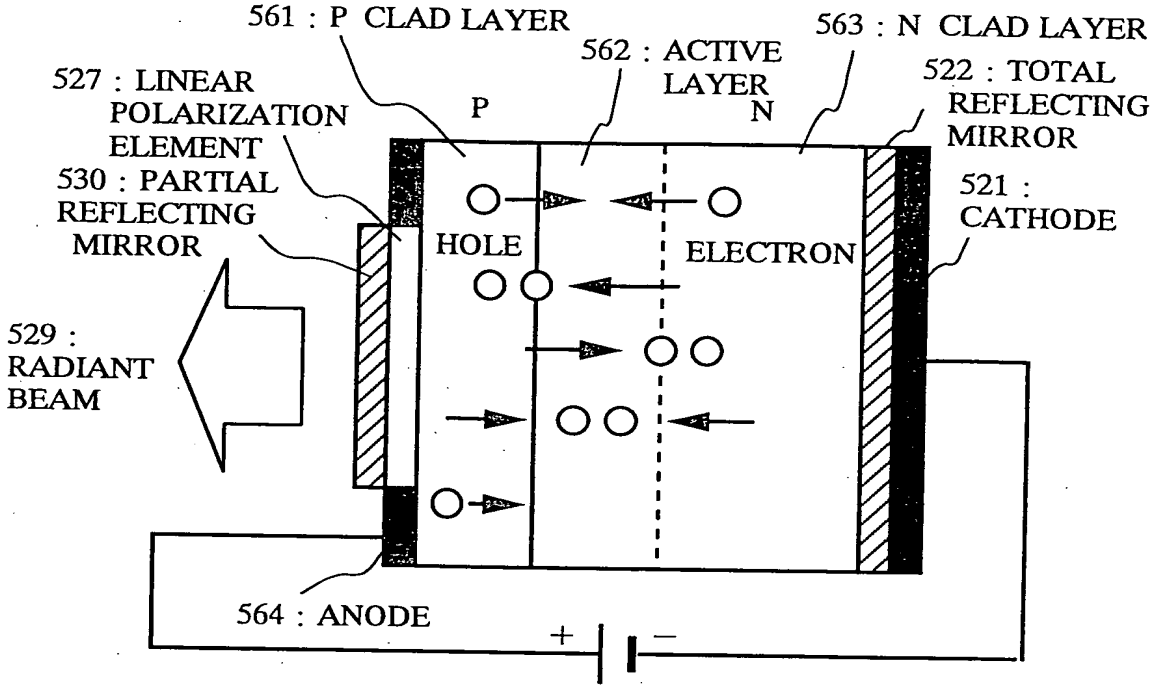

561 : P CLAD LAYER
562 : ACTIVE LAYER
563 : N CLAD LAYER
527 : LINEAR POLARIZATION ELEMENT
P
N
522 : TOTAL REFLECTING MIRROR
530 : PARTIAL REFLECTING MIRROR
521 : CATHODE
HOLE
ELECTRON
529 : RADIANT BEAM
564 : ANODE
+
−

Fig.78

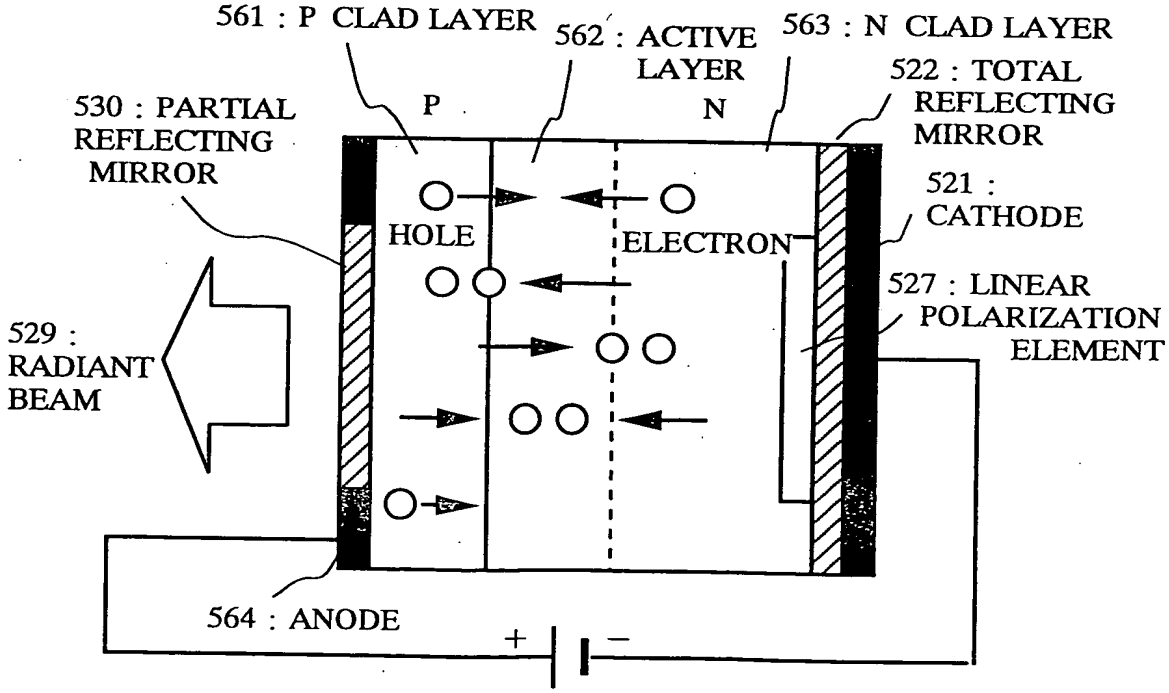

561 : P CLAD LAYER
562 : ACTIVE LAYER
563 : N CLAD LAYER
530 : PARTIAL REFLECTING MIRROR
P
N
522 : TOTAL REFLECTING MIRROR
521 : CATHODE
HOLE
ELECTRON
527 : LINEAR POLARIZATION ELEMENT
529 : RADIANT BEAM
564 : ANODE
+
−

Fig.79

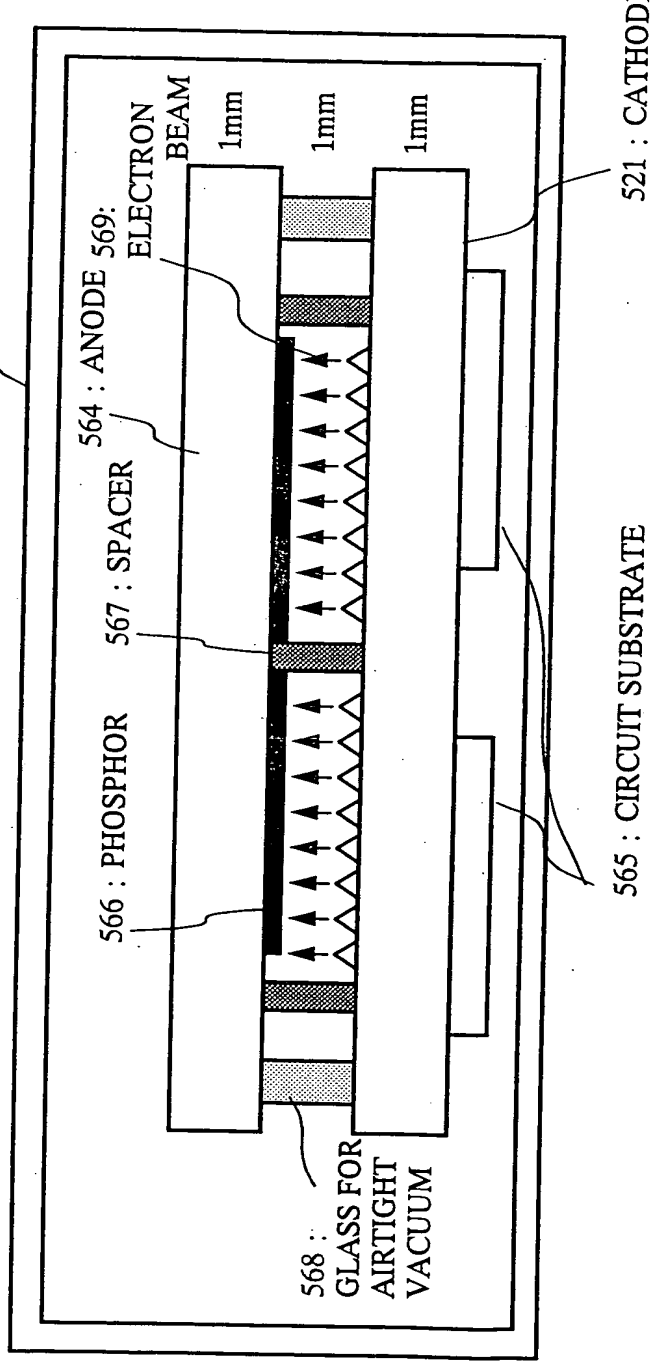

570 : FED
564 : ANODE
569: ELECTRON BEAM
1mm
1mm
1mm
521 : CATHODE
567 : SPACER
566 : PHOSPHOR
565 : CIRCUIT SUBSTRATE
568 : GLASS FOR AIRTIGHT VACUUM

Fig.80

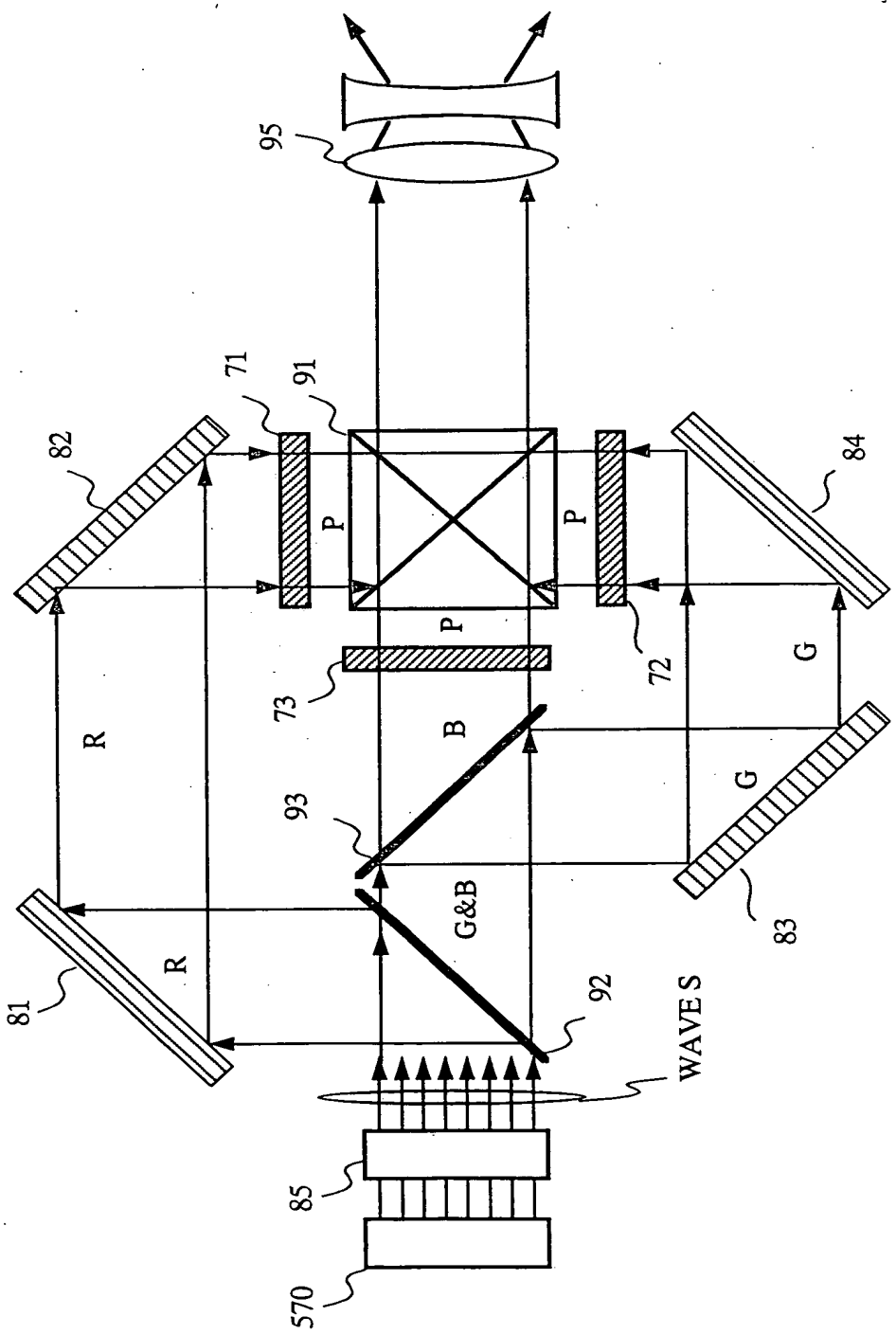


Fig.81

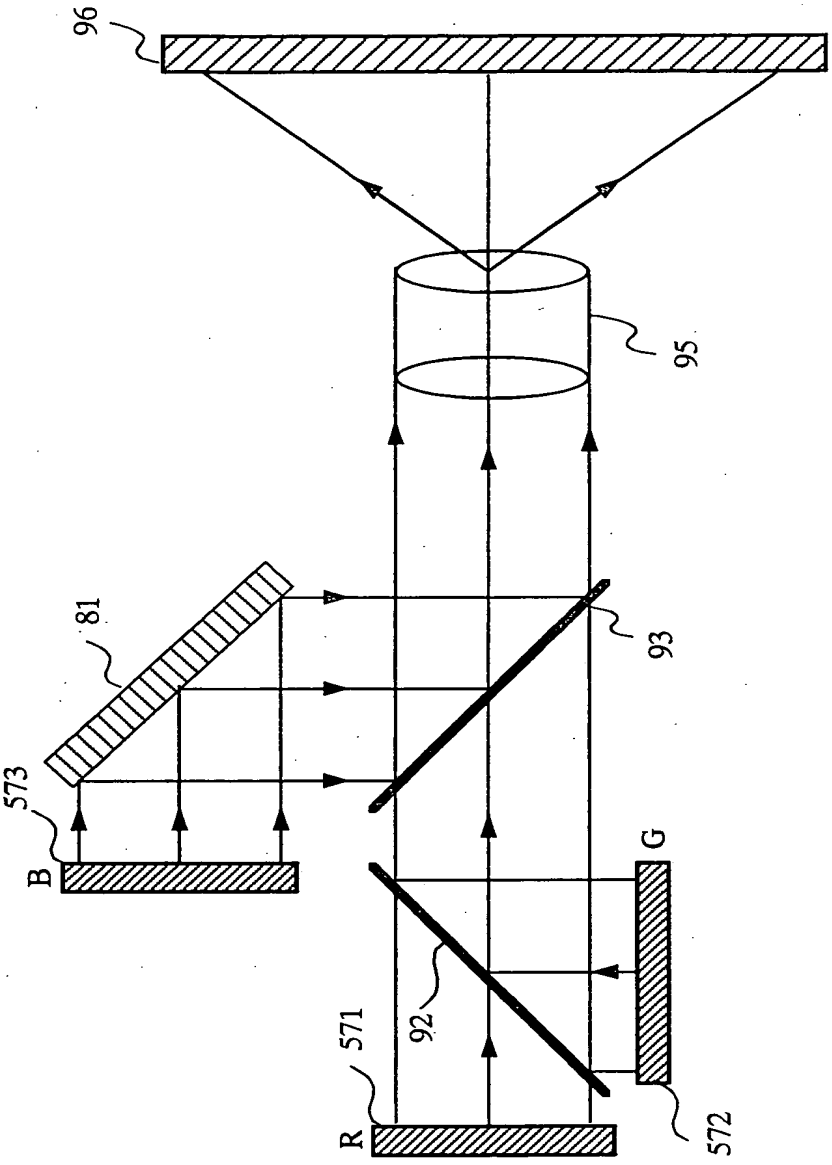


Fig.82

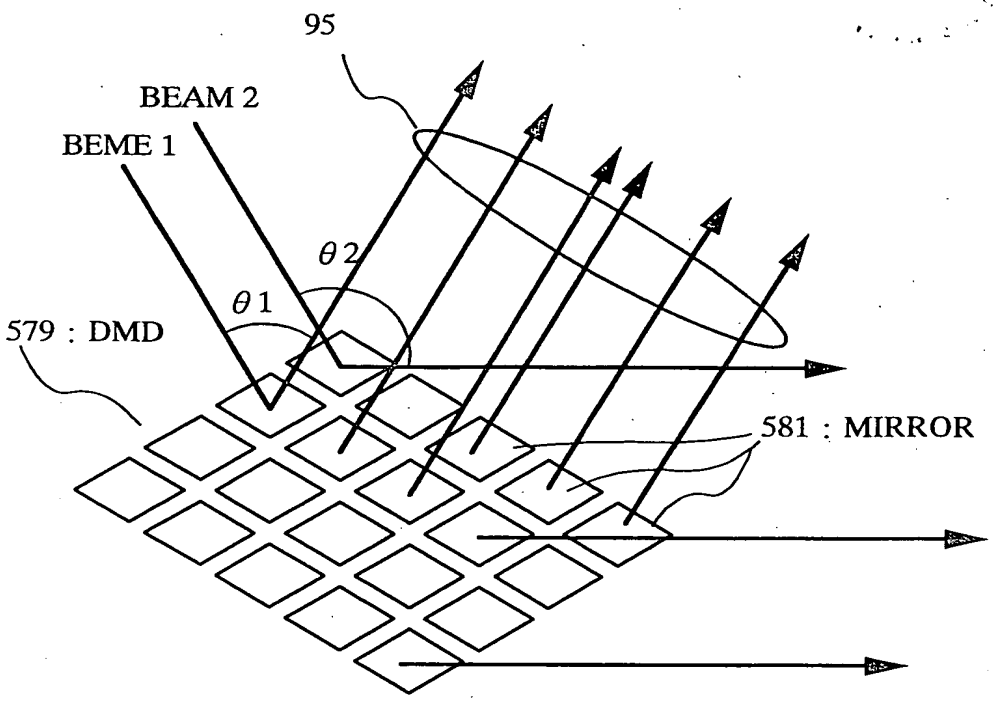


Fig.83

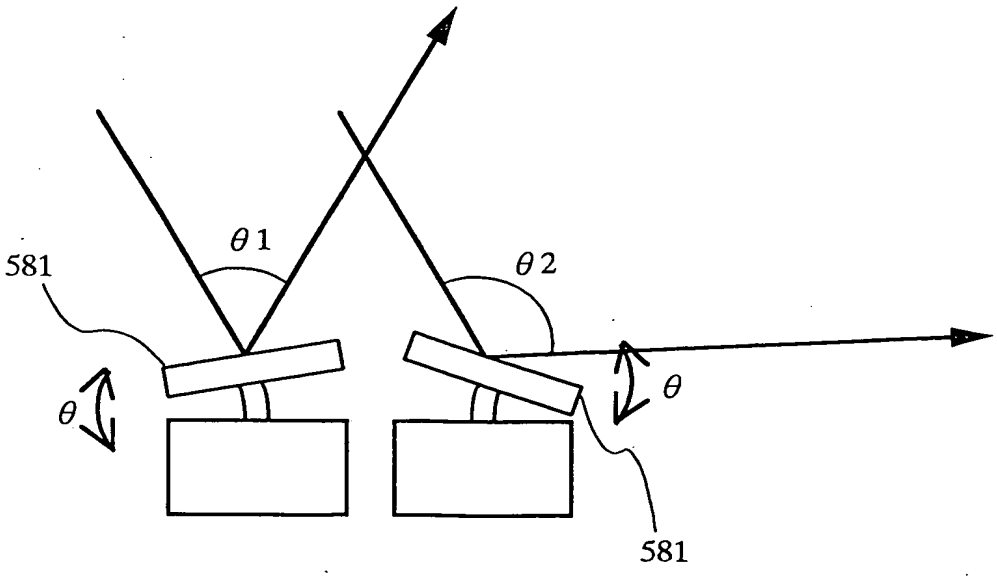


Fig.84

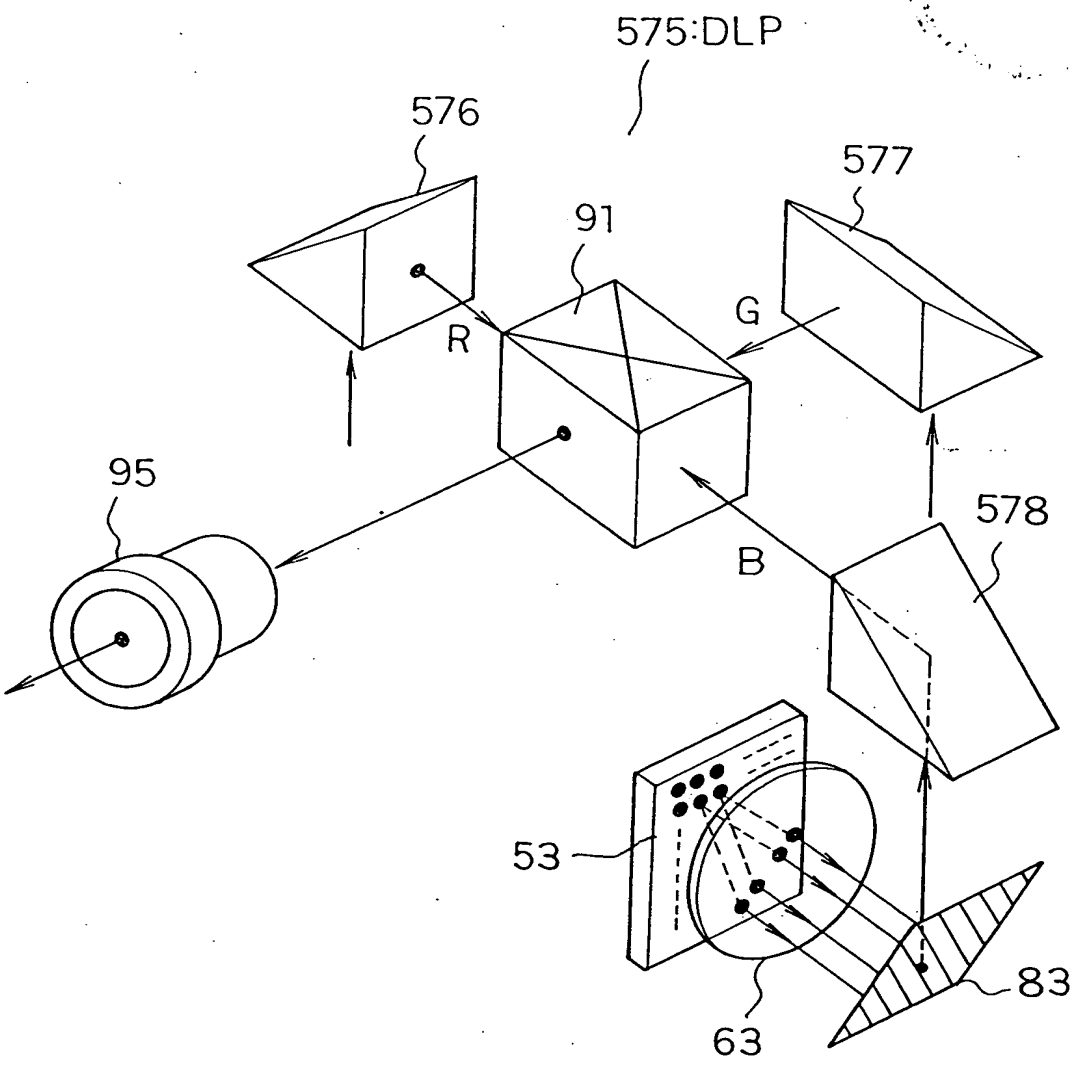
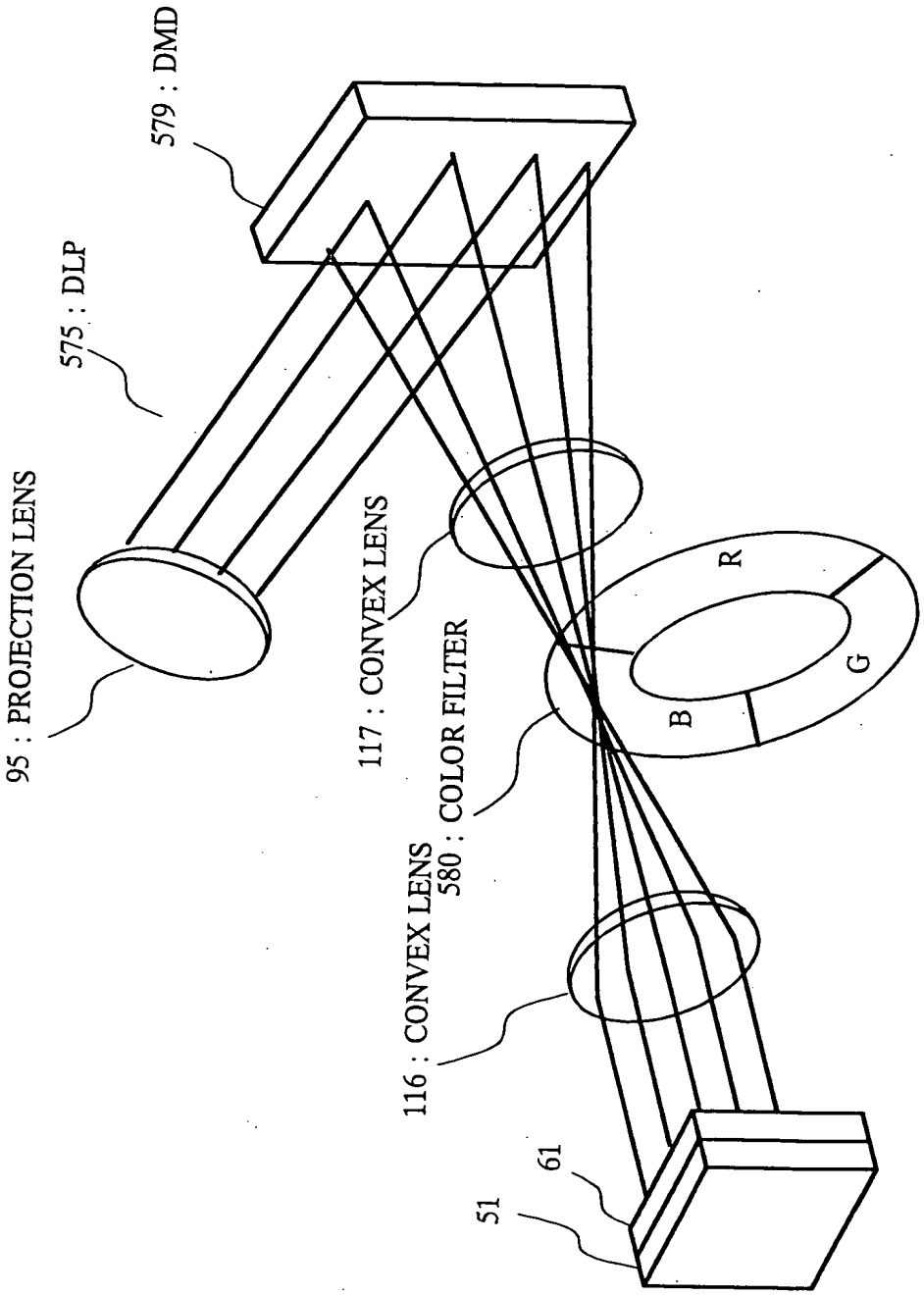


Fig. 85


579 : DMD
575 : DLP
95 : PROJECTION LENS
117 : CONVEX LENS
580 : COLOR FILTER
116 : CONVEX LENS
R
G
B
61
51